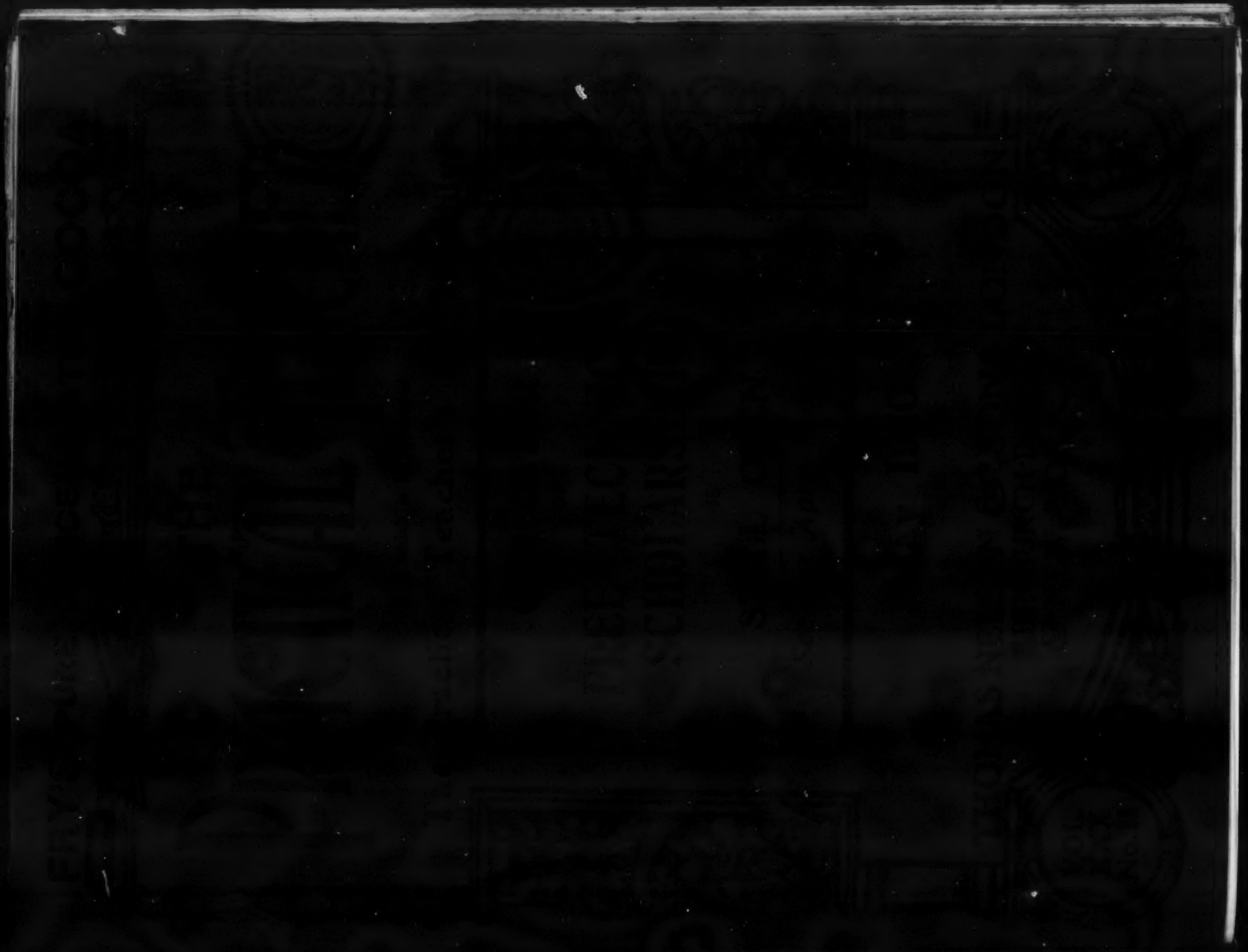

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THE PRACTICAL TEACHER

With which is incorporated

THE PRACTICAL TEACHER'S ART MONTHLY

"It is to be noted that when any part of this paper appears dull, there is a design in it."—*Steele.*

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Central Leaving Classes.

BY HERBERT H. STEPHENS.

BRITAIN'S continued supremacy in commerce depends more on its schools than on its *Dreadnoughts*. Although the way has been opened for the scholar from the elementary to the secondary school, and even to the university, comparatively few are able to follow the path. The extension of the scholarship system is most gratifying, but the children of poor parents are, generally speaking, unable to benefit by the educational facilities thus afforded; and as the fees of secondary schools are far too heavy for meagre purses, a fresh army of boys and girls is sent forth every year ill-prepared, from an educational standpoint, to face the battle of life.

They leave school at an age when they are really beginning to profit by the instruction school affords. Hence arises the need for making the last year at the primary school one of real value.

Leyton's Leaving Classes.

Some three years ago the Leyton District Council attempted to deal with this matter. The Education Committee recognised the fact that in nearly every elementary school there are a few, often a very few, scholars in the ex-VII. Standard who are working with Standard VII., and merely repeating the work of that class.

A Class engaged in learning Office Routine.

Such marking-time often produces the idea among the scholars that they can learn no more—their education is complete! Now, by bringing these few children from each of the different schools into a central leaving class, it was hoped that suitable courses of instruction might be arranged, so that for a twelvemonth at least each scholar might have the opportunity of gaining some training for a commercial career, and begin business life better equipped than by continuing for a second year in Standard VII.

To make the scheme as successful as possible, the co-operation of the parents was invited. Attention was directed to the educational advantages to be gained by attendance at the new "leaving classes." The response was sufficiently encouraging for the Council to establish three such classes for boys, and the same number for girls.

Classification.

As Leyton is a district that adjoins West Ham, with its railway works and factories, and is within easy reach of the City, with its many offices, a double classification was necessary. A course of work was required by lads intending to enter a factory, warehouse, or shop, and another for those wishing for clerkships.

Among the girls, too, this division into two sections was imperative. The increasing demand for girls as clerks in the Civil Service and in commercial houses called for special preparation; while a continued and improved training for domestic life called for another scheme of training.

Should the system of central leaving classes commend itself to other educational authorities, this somewhat crude, dual classification would meet the requirements in large manufacturing towns; but in rural districts and small provincial towns a modification of this plan would be advisable.

Outline Syllabus.

The following is a very brief outline of the syllabus as first prepared for the Leyton leaving classes:—

I.—Girls.

(*a*) *Commercial.*

English.—Reading a standard work. English grammar and composition. Dictation and manuscript copying.

Arithmetic.—Revision of previous work. Commercial arithmetic. Tots.

Bookkeeping.

Geography.

French.

(*b*) *For those preparing for Domestic Life.*

English as above. Household Accounts and Management.

Domestic Economy.—Needlework. An extended *Cookery* course.

II.—Boys.

(*a*) *Commercial Section.*

English.—Reading a standard work. Commercial correspondence and office routine. Commercial history and commercial geography.

Mathematics.—Revision of previous work. Commercial arithmetic. Decimal money and metric system.

Book-keeping.

Shorthand.

French.

(*b*) *Trade Section.*

English.—Reading a standard work. Composition. Commercial history and geography.

Mathematics.—Revision of previous work. Workshop

arithmetic. Mensuration. Measurement and estimation of quantities.

Science.—Physics and chemistry.

Drawing.—Geometry, measurements, plans and elevations, and sectional drawings.

Some changes in parts of these outlines have been necessary; but, on the whole, the scheme as originally drawn up is worthy of consideration.

Teachers.

Owing to differences in ability and disposition, teachers vary in their liking for certain school subjects. Bearing this simple truth in mind, the organisers of the classes obtained the services of several members of the staff at each "central" school to take different subjects with the leaving class. The disadvantages attendant on changing from room to room by the teachers are more than compensated by the improved results in the teaching.

Text-books.

An outlay on special text-books for class or teacher's use was vital to the success of the class. In the selection of books best suited to their needs the teachers found a difficulty in choosing from such a host arrayed in the market. The following are some of the books that have been found most valuable: *A New Shilling Arithmetic*, by Pendlebury and Robinson (Bell and Sons) is a most comprehensive work, and eminently suited to the needs of the leaving class. A special feature of this volume is the metric work.

Commercial Correspondence and Office Routine, by G. R. Walker (Chambers, 1s.), is a cheap and good manual for the scholars. — For teacher's use, Fieldhouse's *Students' Business Methods* (Simpkin, Marshall, 2s. 6d.) supplies full information on so wide a subject. — The same author's *Student's Bookkeeping* (first-year's course, 2s.) is most reliable and thorough. — *A First Year French*, by G. F. Armitage (Simpkin, Marshall, 9d.), has proved an excellent aid.

Office Equipment.

A few of the essential books and apparatus used in an office are very necessary. The old-fashioned copying-press, although giving way to the superior means afforded by the letter-copiers of recent introduction, is nevertheless much cheaper and sufficient for our needs. A press copying or letter book, with a few oil-sheets, completes this part of our equipment.

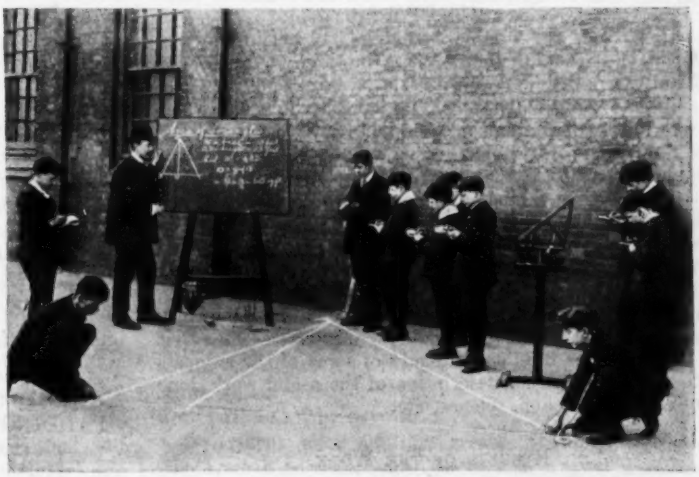
For instruction in the methods of filing, two or three of the usual forms of letter files ("Shannon," "Leader," etc.) are useful. For the modest sum of about £2, Messrs. Partridge and Cooper, of 191 and 192 Fleet Street, supply a complete set of apparatus illustrating an excellent system of "vertical filing."

A ledger, cash-book, and day-books are valuable in the book-keeping lesson. Of course these books are those used in offices, and are not to be confused with the book-keeping exercise books used by the scholars. With these teaching aids, a ready and effective means has been found to make the leaving class familiar with an important part of office routine. After a few introductory lessons, quite a series of letters—bearing the names of local firms—have been devised, copied into the letter-book, indexed, cross-referenced, and filed, thereby making an apparently dry subject to the scholars one of considerable interest.

The ingenious teacher affords his class valuable instruction by the use of a home-made telephone. This naturally leads to demonstrating the manner in which a telephone is manipulated, and how a record of telephone calls is kept. Then telegraphic messages are made out, and their cost estimated.

Commercial History and Geography.

This subject opens up wide areas of study, and the difficulty is to choose the most valuable portions from a utilitarian as well as from an educational standpoint. It has been found advisable to prepare a two-year's course in each of these subjects, so that those scholars who stay a second year may continue their work. Thus a first-year's course in commercial history traces the growth of English commerce up to the beginning of the Industrial Revolution, and a second from that great period to the present time.



A Class engaged in learning the Elements of Surveying.

A two-years' course in commercial geography beginning with the British Isles—especially with regard to the means of internal communication, the natural productions and industries, passing to the trade routes to the Continent, to the East, and to America, and including a brief survey of the countries visited—has proved interesting and valuable. As a guide to the teacher in the preparation of these courses, great assistance has been afforded by Dr. Yeats's *Golden Gates of Trade* (4s. 6d.), *Natural History of Commerce* (6s.), and *Growth and Vicissitudes of Commerce in all Ages* (Philip and Son, 6s.); besides Lionel Lyde's *Man on the Earth* (Blackie, 2s.), *Man and His Markets* (Macmillan, 2s.). The excellent wall-map portfolios of Messrs. Nelson have given great help.

The Newspaper.

The power of the Press is to-day unlimited, and its influence in every region of work and thought cannot be disregarded. The commercial columns of the daily paper, therefore, supply much information necessary for the leaving class. Just as office routine yields con-

siderable scope for interesting teaching, so the money column, the markets, and the shipping intelligence open the way to useful lessons on the Bank, the Stock Exchange, the Exchanges, Lloyds, the Docks, etc. Two simple but valuable books published by Messrs. Isaac Pitman and Sons, *The Commercial Reader* ("Intermediate," 1s. 9d., and "Senior," 2s.), yield the teacher much information.

Reading.

Although the syllabus gives "a standard book" for reading, three or four dozen of the different juvenile books chosen from Dent's "Everyman's Library," Cassell's "People's Library," Blackie's "Famous Books," and Nelson's "Sevenpenny Library," are preferable to one reader for the whole class. When other work is finished, or while a scholar is waiting for a more tardy classmate to complete his task, the reading book is useful for the few odd moments, and fosters the habit of using spare time in a valuable way, creates a liking for the reading of good (not goody-goody) books, and develops powers of thought and expression. The occasional reading aloud is not neglected.

Drawing.

Here, too, the original syllabus has been modified, for if the teaching follow these lines very little scope is afforded original effort. The working out of geometrical problems may call for considerable care; but as a means of training in form and colour, of representing on paper the objects we see, and designing some simple pattern, geometry must fail. For these reasons the drawing of models and common objects, the copying and the inventing of designs, and the painting of simple patterns, occupy the greater part of the drawing time of the "trade" section. Unfortunately Leyton's central schools have no facilities for manual training, and so a beneficial course of woodwork or metal work cannot be attempted.

Enough has been said already of some of the subjects to prevent a further description of the useful work done in cookery, French, science, etc.

Results of the Work.

One of the best proofs of the success of the classes is their increasing popularity. Beginning in February 1907 with six centres, there are now just twice that number. Owing to straitened circumstances at home, and the anxiety of a certain number of parents to launch the children into work on their fourteenth birthday, many of the scholars leave before the expiration of the year; but, on the whole, the parents endeavour to fulfil their promise by giving their children the educational opportunity the leaving classes afford.

It is to be hoped that the day is not far distant when such centres will be found in other parts of the country, and that they may not only prove a more fitting termination to the school life, but a stepping-stone to employment. If employers can be induced to apply to such leaving classes when they require boys or girls in their businesses, instead of using the advertisement column of the newspaper, they will be more likely to secure fitter candidates, chosen by the discretion of the teachers, who are so soon able to recognise the varying capabilities of their scholars. Thus may the leaving class prove a potent factor in the efficient organisation of the primary school.

THE APPRENTICESHIP AND SKILLED EMPLOYMENT ASSOCIATION.

WE have pleasure in giving, at the request of some of our readers, the addresses of the Affiliated Committees in London of the above Association :—

SOUTHWARK (WEST).—Registry and Apprenticeship Committee, Women's University Settlement, 44 Nelson Square, Blackfriars, S.E.

NORTH LAMBETH.—Apprenticeship and Skilled Employment Committee, 131 Kennington Road, S.E.

CAMBERWELL.—Apprenticeship and Registry Committee, 17 Peckham Road, S.E.

WALWORTH.—Apprenticeship and Skilled Employment Committee, 49 Saltwood Grove, Liverpool Street, Walworth, S.E.

STEPNEY.—Skilled Employment Committee, 52 High Street, Whitechapel, E.

BETHNAL GREEN AND SHOREDITCH.—Skilled Employment Committee, St. Hilda's, Old Nichol Street, Bethnal Green, E.

HAMPSTEAD.—Apprenticeship and Skilled Employment Committee, 15 Lithos Road, Finchley Road, N.W.

ST. MARYLEBONE.—Skilled Employment Committee, 51 Upper Baker Street, N.W.

ISLINGTON.—Skilled Employment Committee, 19 Compton Terrace, Highbury, N.

CHELSEA.—Apprenticeship and Skilled Employment Association, 264 King's Road, Chelsea, S.W.

FULHAM.—Apprenticeship and Skilled Employment Committee, 38 Barclay Road, Walham Green, S.W.

KENSINGTON.—Apprenticeship and Skilled Employment Association, 140 Church Street, Kensington, W.

PADDINGTON.—Apprenticeship and Skilled Employment Association, 37 Sutherland Avenue, Harrow Road, W.

WESTMINSTER.—Skilled Employment Committee, St. Andrew's Institute, Carlyle Place, S.W.

SOUTH ST. PANCRAS.—Skilled Employment Committee, 7 George Street, Euston Square, N.W.

GREENWICH.—Skilled Employment Committee, 4 Nelson Street, Greenwich.

AFTER-CARE COMMITTEE for the Blind, Deaf, and Crippled, 91 Parliament Chambers, Great Smith Street, S.W.

Committees Dealing with Girls Only.

WEST CENTRAL JEWISH GIRLS' CLUB.—Employment Bureau, 8 Dean Street, Soho, W.

MAURICE HOSTEL.—Trades Registry and Apprenticeship Committee, Maurice Hostel, 51 Herbert Street, Hoxton, N.

JEWISH BOARD OF GUARDIANS.—Industrial Sub-Committee for Girls, Butler Street Club, Spitalfields, E.

NORWOOD JEWISH ORPHANAGE.—16 Buckley Road, Brondesbury, N.W.

Back to the Land.

THE EXPERIENCES OF A NOVICE.

[Many of our readers are at present taking a very keen interest in small holdings, and are closely watching the movement "back to the land." The Editor has therefore much pleasure in introducing to his readers a new contributor, who recently forsook the delights of city life for rather more than three acres, but not even, as yet, the shadow of a cow. As the months progress, the writer hopes to relate his experiences, good and bad. He is not above taking advice, and if any experienced readers of this column care to write to him, *via* the Editor, letters will be forwarded, and, if necessary, answered or commented upon in the following issue.]

I CAME into my small holding on Ladyday, and although I am writing so soon after this great event, my experiences have been such that it is difficult to know quite where to commence.

First of all, I must describe my holding. It is in reality a poultry farm; but my eggs are not all to be in one basket, for my reading has at least taught me that poultry cannot be relied upon for a living; but it can be made to pay, and if it does that I shall be satisfied.

I have nearly three-quarters of an acre round the house laid out in ten runs with fowl-houses, and a meadow of about four acres, wire-netted all round, where some of my birds can have the free run which is so essential to a full egg basket.

Adjoining the home runs are an incubator house—with a "Cypher" holding two hundred and forty eggs, and a "Tamlin" accommodating sixty eggs—a large span-roof building, which is to be made into a summer parlour, oil and food lodges, carpenter's shop, and a fattening shed.

Between the ten runs is a larger one, on which repose the foster-mothers, which will soon, I hope, be all filled with strong and active chicks. At present only one is in use, and has a complement of forty-four chicks about three weeks old. They require a lot of attention and constant feeding, to say nothing of keeping the lamp well trimmed and the temperature at about 70°.

This foster-mother I nearly lost the very first day. The lamp exploded, and the structure caught fire; but fortunately a bucket of water saved a disaster, and hardly any damage was done. Had the misfortune happened at night, there would have been roasted chicken in the morning.

One of my pens is occupied by twenty-two chickens about three months old. They are a bonnie crew, and very plump. When I arrived they had a free run all over the place; but as they interfered with the smaller chicks I removed them to a separate pen, with a fresh, cold brooder for a house.

Late at night I moved them to their new home, and thought they would settle down. Next morning they soon found a weak spot in the wire netting near the hedge, and were soon sunning themselves in all parts of the yard.

I got them safely penned again; but at night they refused to go to bed, and settled down in a corner of the pen. Again I had to lift them and plant them in their brooder. The third night they stayed up after all well-behaved birds had gone to roost, but eventually they all found their way to rest.

My whole stock at present is fifty-four adult hens and cocks, and sixty-four chicks. The colony of fowls in the meadow give the least trouble, and already they answer to my whistle and crowd round me at feeding-time. They are getting a morning meal of soft food, and in the evening a good feed of wheat or oats. As far as eggs are concerned, I fancy they are doing pretty well, for I rarely get less than twenty eggs a day, sometimes as many as twenty-five.

Although I have the fattening shed, I do not intend to take up that branch of the business at present, but shall sell my chicks when large enough to the higgler when he comes this way. Prices are high at this time of the year, and my twenty-two larger chicks should sell well.

Three hens became broody on my taking possession, and these having settled down have had their eggs given them, and I hope they will prove good sitters. I have started the small incubator with fifty of my own eggs, partly for my own experience, and partly because any chicks thus produced will fill in any gaps that may be wanted to complete the broods which will be forthcoming from the sitting hens.

I hoped to have had a younger lot of chicks than those I have mentioned, but the hatch came off very badly. The incubator had to be moved during the last week, as it stood on a table in the house. The result was disaster, as the few chicks that arrived were either weak or lame. When I came only four chicks were left, and they have since succumbed.

At present mice are our greatest trouble. To us who have been accustomed to live at a good distance from them, we find their friendliness most trying. The food lodge is simply swarming with them, and at night they come out of unexpected places. War, however, has been declared, and the "Danysz Virus" will, we hope, do its deadly work.

In the meadow a man is at work turfing half an acre, which by my lease I am allowed to crop. This will be my market garden. The ploughing and planting have yet to be done.

A lovely view is obtained from the meadow, and my wife finds much pleasure in looking for stray eggs, which hens *will* lay in any but the right place. In the near future bees are to be taken in hand, and sties made for my prospective pigs; but at the moment I find my poultry yard as much as I can manage. Wire-netting does not last for ever, and a lot of repairs are needed; in fact, everything requires overhauling. The houses have already been lime-washed inside and creosoted outside.

I asked my wife, who like myself is fresh to country life, what she thought of the change. She replied that "some things were too great for words." I am still wondering what she could possibly mean!

The New Constructive Movement.

SUGGESTIONS FROM AMERICAN SCHOOLS.

BY W. H. WINCH, M.A.

EDUCATIONISTS are all keen nowadays about continuation schools, especially about such schools as shall continue the manual work of the elementary school in a more severely technical direction. America's solution of the problem is the Manual Training High School, which I hope to describe shortly. But meanwhile it may help us if we examine just what sort of work it is which the Manual Training High School sets out to continue. A fair and typical example of this work may be obtained from any one of the highly-developed school systems of the large towns. Let me select one from a

NEW YORK CITY ELEMENTARY BOYS' SCHOOL.

"SHOP"-WORK.

The class consisted of boys in Grade VIII. B, the graduating or final division of the highest standard in elementary schools. Thirty-one children were present, three of whom were twelve, six of whom were thirteen, eight fifteen, and two sixteen years old.

The manual training room or "shop"—"shop," in American, means a place where things are *made*, not where they are *sold*, we may remember—was situated just beneath the roof of a high building, immediately adjacent to the school gymnasium. It contained thirty benches, each bench accommodating two pupils. Not until Grade VIII. (our Standard VII.) was reached did the pupils commence shop-work, properly so called. In Grade VI. Sloyd knife-work preceded the tool-work in the grades above. The constructive work in the "shop" is done after the requisite preliminary drawing has already been performed in the ordinary class, under the direction of the ordinary teacher of the class.

The manual training teacher took half a session, one and a half hours only, with the boys then present; another set of boys would use the room during the second half of the session. Half a session once a week would not seem to us an extravagant time to give to "shop," and this only during the passage of the pupil through Grades VII. and VIII. But then the drawing, necessary as a preliminary, had already been done, as I have said, in ordinary class *outside* the time devoted to manual training. It surprised American teachers to be told that we in England begin bench-work as low down as Standard IV. (Grade V.), and that we give a whole session every week at the manual centre. But our drawing for the constructive work is done at the centre itself, and consumes much time. "Don't the boys draw in their classrooms?" said an American teacher to me. "Yes," I said; "they draw freehand, they draw models, and do geometrical exercises." "And what sort of geometry?" he asked. Then I saw his implied argument—namely, that the geometry in boys' schools should be directly preparatory to the tool-work. "We take no other sort of geometrical work at all," he said. "But how do you secure co-ordination?" I asked. "Well, I guess that's what the Principal is here for," he answered. "I see; you have the drawing taught by the better *teacher*," said I, "not by the better craftsman." "That's not quite it: our manual training teachers must now be college graduates (college trained, we say), and they are eligible for transfer to ordinary class-work if they wish it. It's important work," he said, "and we must have good men with a real chance of promotion to stimulate them." He was surprised to learn that the bulk of our "shop" teachers were mechanics, trained by practice, but otherwise not teachers in the ordinary sense. I gathered from him that this was a system that New York was moving away from.

The differences in organisation between the American and English systems are outstanding and important, as English teachers will readily see. May I say that I think that *all* the advantages are not on our side?

Now let us turn to the work itself. Individual variations in the preliminary drawings are allowed—nay, are required; and these variations are, of course, worked out in the wooden things actually constructed. We exact much greater uniformity. The New York boys pass rapidly on to the making of things which they themselves regard as objects of practical utility: we spend more time in exercises to produce a correct manipulation of a tool, and in models which specifically illustrate a particular construction. To each the defects of their qualities—to the American, inaccurate work and slovenly finish; to us, a slavery to habit, whose servility to routine is shutting us out from many of the new markets of the world. Let me be fair. I saw many well-constructed objects—little stools, chairs, and tables—excellently made in the American "shop." But such work, saved up for inspection by visitors, was perfectly useless as a guide to the actual, daily, ordinary work of the schools, which is comparatively slovenly and is not very accurate.

What are we to do? We want the American alertness and adaptability, if we can get them, and do not want to lose our own more patient finish. I do not speak of mere ornament, which has no basis in the usefulness and purpose of the thing. We do not want construction for the sake of ornament—the million needless stitches of our grandmothers—but we do want work which is beautifully constructed, as far as we ought to expect this from children and young people.

I do not think the problem is quite insoluble. We can *alternate* our class models and our individual instances—our exercises in observation, so to speak, with our exer-

cises in imagination. I have strong experimental evidence for believing that power in one of these directions by no means excludes facility in the other, of which evidence more, perhaps, anon.

The final stage of the constructive work in the ordinary courses of the elementary schools of America is, then, like our own—indeed more exclusively than our own—confined to wood-work. For instance, we have, here and there, some regular courses in metal-work which America has not—at least as far as the ordinary work of the elementary school is concerned.

But, as I pointed out last month, the vacation school provides greater variety; and it may be profitable, for the sake of variety, to turn once more to schools of this type.

NEW YORK VACATION SCHOOL FOR BOYS.

Basket-Work.

The class (a section merely) consisted of eleven boys, ranging from eight to fourteen years of age, and belonging to Grades III. and IV. (Standards II. and III.).

The children were drawing a design of a basket before making one. The designs were of various proportions. "We do not wish them to draw the same basket," said the teacher; "we want them to give us their own idea." But I understood that some guidance had been given as to proportion, and that the children had been shown a basket to help them with their drawing, though the basket previously exhibited was now nearly out of sight behind the top of the teacher's desk. This basket, however, I was told, was not the one which they were going to make, and which the other section of the class was making.

It is really wise to introduce the children's preferences, in so far as they exist, for one form of basket rather than another; but they should be able to make a basket of some kind before individual taste and variation can possibly be expressed in executive skill. We must remember that many deviations from pattern are not the result of a desire to make a more beautiful object, but merely of mal-observation or of manipulative bungling. No amount of "idea" will compensate for incompetence in perceptual power and executive dexterity. An imagination which cannot distinguish itself from the perception of the object seen is not, in a truly psychological sense, imagination at all. "What," said I to the Principal, "is really guiding the children in their choice?" She answered, "The children just draw any old thing."

Let me give one more instance of constructive work in the vacation school. I give it because it was based on a very different methodology from the exercise in basket-work; it was, so to speak, at the other pole of the methodological axis.

NEW YORK VACATION SCHOOL FOR BOYS.

Venetian Iron-Work.

This was a large class for work of this kind. Forty pupils were present, from ten to sixteen years of age, containing pupils from Grades IV. to VIII. of the elementary school, and from the first and second years of high school.

Each pupil had a board and a pair of pliers; a few shears were provided, and some small hammers.

The pupils were working definitely and exactly from "working" drawings, all of which had been made, and very carefully made, by the teacher himself, not by the pupils. One of these drawings is reproduced below, much reduced in size; and I append also the measurements which, though marked as belonging to the drawing, really give the proportions of the object to be made,

as my readers who are accustomed to "working" drawings will know.

A = 2 pieces $5\frac{1}{2}''$
B = 1 piece $21\frac{1}{4}''$
C = 1 ,, $5\frac{1}{2}''$
D = 1 ,, $9\frac{1}{4}''$
E = 1 ,, $3\frac{1}{4}''$
F = 1 ,, $4''$
G = 1 ,, $5\frac{1}{4}''$
H = 1 ,, $4\frac{1}{2}''$
I = 1 ,, $3''$
J = 1 ,, $4\frac{1}{4}''$
a − b = $\frac{7}{8}$
R = rivet.

The course appeared to commence with small candlesticks, and progressed to brackets and big chandeliers. There was some good work, but many very broken curves. There was no doubt, however, of the interest which the work inspired (attendance at vacation school is voluntary, be it remembered), and it was an interest in the making of something definitely planned and set out for them to do. The initiative exercised was not, in this case, an initiative to express an "idea" of their own, but to realise in material the "idea" of their teacher. But the manipulative skill exhibited was still of a low order. This lack of mechanical dexterity may be a national characteristic which no school method can overcome. If that is so, we must hesitate before we pronounce quite certainly that want of accuracy and finish are the result of the usual American ideals and methods of constructive work.

(*To be concluded.*)

A NEW COURSE OF PRACTICAL AND CONSTRUCTIVE WORK,

ARISING OUT OF AND COMBINED WITH THE ORDINARY SCHOOL SUBJECTS.

For Junior, Middle, and Upper Divisions of Primary Schools.

BY A. R. PICKLES, M.A., AND DALTON GRANGE.

JUNIOR COURSE.

LESSON 21.—THE AREA OF THE SQUARE.

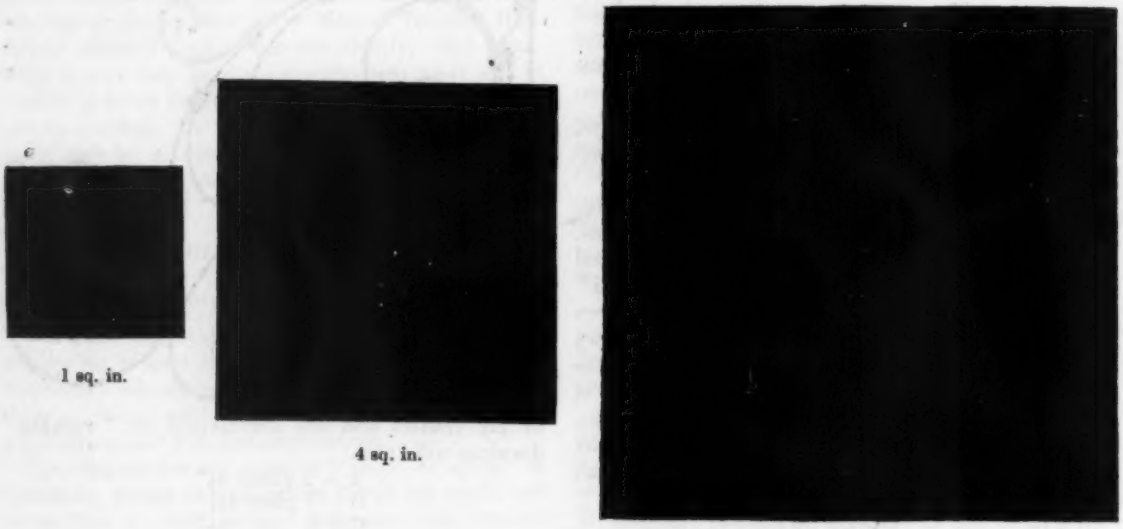
1. Cut out of coloured paper a 4-inch square. Divide each side into inches, and join opposite points by straight lines. Cut along each line. What do you get? How many small squares have you? What is the length of each side of one of these squares? What name would you give to each of these little squares? Why would you call it a square inch? Fix one of these small squares in the book, and write opposite to it "one square inch."

2. Arrange some of the remaining pieces to form a square of 2-inch side. How many have you used?

3. Repeat with a square of 3-inch side. How many have you used this time? How many small pieces have we left? How many square inches in a square of 2-inch side? 3-inch side? 4-inch side? 5-inch side? etc. How do you find out how many square inches in a square?

4. On pieces of practice paper draw squares of 5 inches, 6 inches, 7 cm., 8 cm., 9 cm., 10 cm., and find their areas by cutting out.

How the Pupil's Page could be Arranged.



1 sq. in.

4 sq. in.

9 sq. in.

SOME EXERCISES.

1. Cut out a square of 5-cm. side on gummed paper. Divide each side into centimetres. Join opposite points.

(*a*) How many square centimetres is the whole square divided into, or what is its area? Cut from the end of the top row of squares two squares at each end. Repeat with the bottom row. Cut one square from each end of the second and fourth rows. Draw in the book a square of 5-cm. side, and divide into square centimetres. Place the squares cut off in this square, so that they are in the same position as they were before being cut off. Gum into your book the large piece by the side of this. (See pupil's page.)

(*b*) How many square centimetres have been cut off, or what area has been cut off?

(*c*) How many are left, or what area is left?

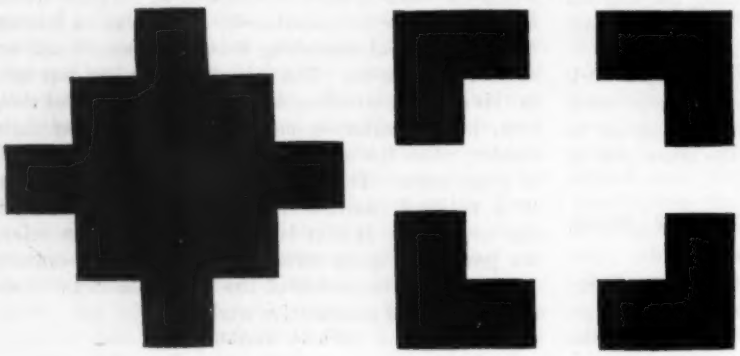
2. Cut out of yellow paper a square of 6-cm. side. Divide each side into centimetres, and join opposite points.

(*a*) How many square centimetres in the whole square, or what is the area of the square? From the second row of squares cut one square at each end. Cut two squares from each end of the third row. Repeat at the ends of the fourth row. Cut one square from each end of the fifth row. Draw in the book a square of 6 cm., dividing each side into square centimetres. Place the squares cut off in their proper position on this square.

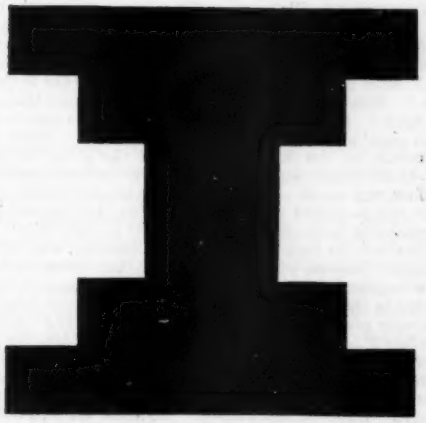
(*b*) How many square centimetres have been cut off, or what area has been cut off?

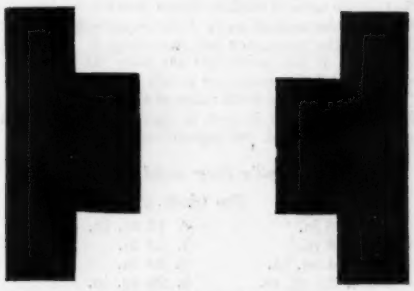
(*c*) How many square centimetres are left, or what area is left?

How the Pupil's Page could be Arranged.



(*a*) 25 sq. cm. in square.
(*b*) 12 sq. cm. have been cut away.
(*c*) There are left—
25 sq. cm.
12 sq. cm. cut away.
13 sq. cm.





(*a*) In the whole square there are 36 sq. cm.
(*b*) Twelve centimetres have been cut off.
(*c*) There are left—

36 sq. cm.
12 sq. cm.
24 sq. cm.

Lesson 22.—Paper Folding.

Draw as shown in the diagram (Fig. 1). Cut away the shaded portions, and along the line AB. Fold along the dotted lines. Fig. 2 shows how the chair is folded. The square (*e*) is opposite to (*c*), while (*f*) is opposite to (*d*).

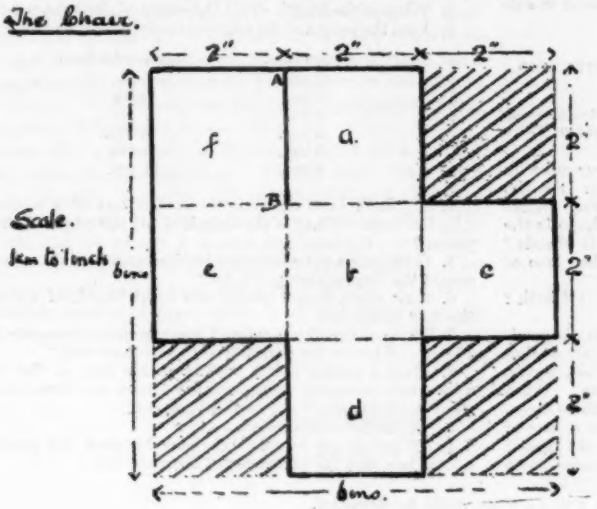


Fig. 1.

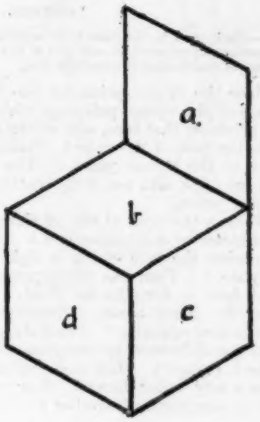


Fig. 2.

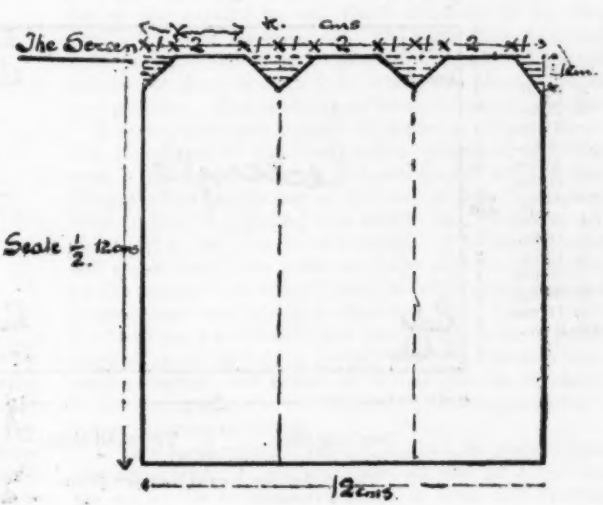
Some Questions.

1. What is the distance round three sides of the back ?
2. Round the four sides of the seat ?
3. What is the area of the seat ?
4. What is the total area of paper ? Put the paper making up the chair flat on the desk.
5. What area was cut away ?
6. Write down the difference between the part cut away and the part left.
7. What was the perimeter before cutting ?
8. After cutting ?

Fold the paper up again to form the chair.

9. Not reckoning the back, how many square inches of paper have we used to form the chair ?
10. Write down the length of one of the edges of the chair in centimetres.

Draw as shown in the diagram. Cut away the shaded portions in the shape of six half squares. Arrange on the desk so as to form three squares. Fold along the dotted lines so as to form a screen.



Some Questions.

1. What was the area of the paper before cutting ?
2. How much was cut away ?
3. How much is left ?

Press the three parts of the screen together so as to show that the three parts are exactly equal.

4. What is the area of each of these parts ?
5. What was the area of each of these parts before cutting ?
6. What was the perimeter before cutting ?
7. How much of this perimeter has been cut away ?
8. How much of the perimeter is left ?
9. What is the area of both sides of the screen ?
10. How much would it cost to paint one side of one of the wings of the screen at 1d. per square centimetre ?

How the Pupil's Page could be Arranged.

The Chair.

1. 6 in.	6. 12 sq. in.
2. 8 in.	7. 24 in.
3. 4 sq. in.	8. 24 in.
4. 24 sq. in.	9. 20 sq. in.
5. 12 sq. in.	10. 5 cm. (about).

The Screen.

1. 144 sq. cm.	6. 48 cm.
2. 3 sq. cm.	7. 8 cm.
3. 141 sq. cm.	8. 40 cm.
4. 47 sq. cm.	9. 282 cm.
5. 48 sq. cm.	10. 3s. 11d.

NOTE.—Where a modelling exercise is set out, the drawing will not appear in the pupil's book, and, generally speaking, these drawings will be larger than the rest. If it is thought fit, the drawings, or some at least, might be done *half size* in the books as practice in reduction and a preliminary to scale drawing.

SECOND YEAR'S COURSE.

LESSON 23.—THE SQUARE PRISM—ITS FACES, EDGES, AND CORNERS.

NOTE.—Each pupil in the class to be supplied with a square prism of strong paper, cardboard, or wood, in addition to the cube. Three inches long with a square end of 2-inch edge is a suitable size.

1. Place the square prism on the desk. Place your cube on that face of the square prism on which it exactly fits. Set the square prism on that face, and on the top place the cube. What shape is the face of the cube ? Take it off. What shape is the top face of the square prism ? The face on which it stands ? Take your cube, and see if it exactly fits on any other face of the square prism.

2. What is the area of one of these square ends ? Of both ? The perimeter of one square end ? Of both ?

3. Number the face which is right in front of you—a good-sized figure 1. Turn the prism round from right to left so that another face is brought in front. Number 2. Turn again. Number 3. Turn again. Number 4. Turn again. What number is now opposite ? Place the cube on one of these faces. What is the difference between one of these faces and a face of the cube ? (longer). How many of these long faces are there ? Are there any other faces ? How many ? How many faces has the square prism altogether ?

4. Now, direct pupils to place the square prism on the drawing-book, with face 4 on the book, to hold it firmly in position with the left hand, and to trace carefully round the long face of the square prism with the lead pencil. Then take away the square prism. How many lines have you drawn ? What is their total length ? How much longer are the two long lines than the two short lines ? Place the side numbered 1 on the pencil drawing. Do the same with the sides numbered 2 and 3. Place the sides that remain on the drawing. Now set the prism on a square face. Hold firmly, and go round it with the lead pencil. Place the other end on it. The pupils will no doubt discover that four of the faces are equal to each other, and longer than the two remaining faces which are also equal to each other.

5. Measure the long side of the first drawing, and write on it its length. Repeat with each of the other three sides. With your set-square measure each angle. How many right angles are there in the drawing ? How many in the four long faces of the square prism ? In the two remaining faces ? How many altogether ?

How does this drawing differ from the square ? What do you know about the sides of the square ? Which sides are equal in this drawing ? What is it the drawing of ? Give the name rectangle. Write on blackboard. Children write in books.

SOME QUESTIONS.

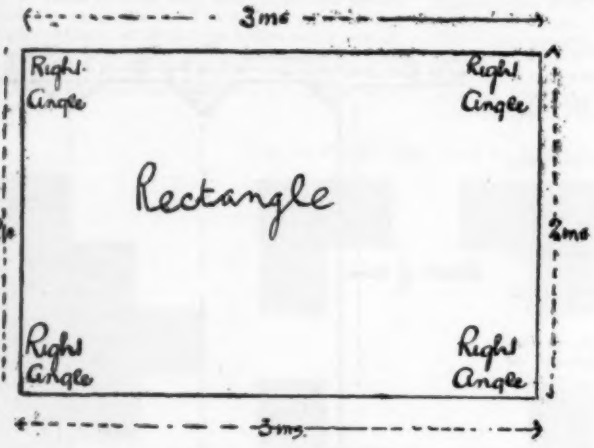
1. What is the sum of the faces, edges, and corners of a square prism ?
2. What is the length of all the edges of the square prism ?
3. Find the length of the edges of the following square prisms :—

Square Face.	Rectangular Face.
2 in.	4 in.
3 in.	5 in.
4 in.	7 in.
4 cm.	8 cm.
3 cm.	9 cm.
5 cm.	11 cm.

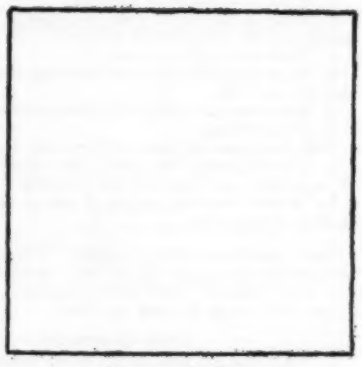
4. A 3-inch cube fits exactly at the top of a square prism 7 inches long. What is the length of all the edges of the square prism ?
5. If the cube were fastened to the square prism, what length would the new square prism be ?
6. How much longer would the total length of the edges of the new prism be ?
7. Three of the short edges of a square prism measure together 15 cm. What is the perimeter of one square end ?
8. Place a square prism with a square face on the desk. If a long face measures 6 cm., and the square face measures 2 cm., what is the length of the vertical edges ?
9. Of the horizontal edges ?
10. What would be the difference between the perimeter of a long face and the perimeter of a square face ?

How the Pupil's Page could be Arranged.

1. 26.
2. 28 in.
3. 32 in.
44 in.
60 in.
64 cm.
60 cm.
84 cm.
4. 52 in.
5. 10 in.
6. 12 in.
7. 20 cm.
8. 24 cm.
9. 16 cm.
10. 8 cm.



Two long sides. Two short sides.
Opposite sides are equal.
This is the long face of a square prism.
It is a rectangle.



Four equal sides.

(To be continued.)

SPANNING THE GULF;

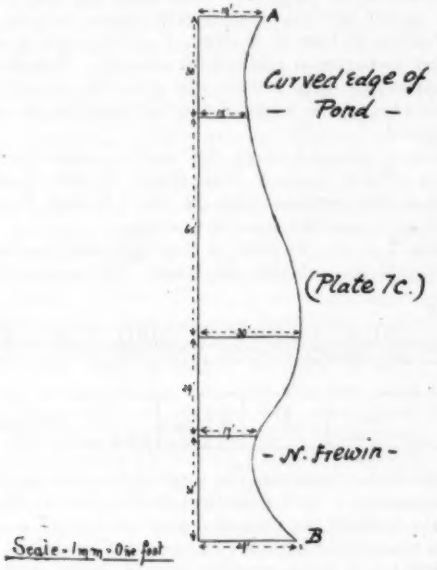
OR, KINDERGARTEN INSTRUCTION FOR THE UPPER STANDARDS.

BY H. G. STYLES.

IN the previous article I gave instructions for a first lesson in the open air with a plane-table, and by the time this is in print it ought to be possible to put the same instructions into practice. For many, however, exercises with a plane-table will, I fear, be limited to the playground; while, owing to the vagaries of our English climate, there will be many occasions during the ensuing months when open-air work will have to be suspended by all. I therefore make no apology for introducing one or two exercises suitable for the playground and classroom, leaving the teacher to add others according to circumstances.

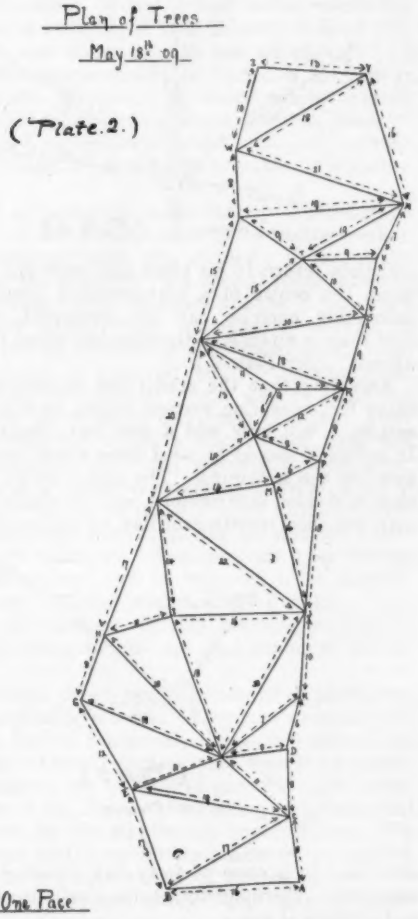
I must first, however, explain how the table previously described is adapted for such exercises. If the reader will refer to page 427 of the *Practical Teacher* for February, he will see in Diagram 2 a sectional elevation of the apparatus I now describe. It will be observed that only one table is used by the whole class, each scholar in turn stepping to the apparatus, sighting for himself, and then marking the direction with protractor on his paper, which should be fastened to millboard suspended from the shoulders if working in the open.

Remove the millboard or drawing-board, and fix the circular disc (A) on the stud. If the table has been made as directed, the stud will protrude above this disc by about ⅛ inch. Now screw the second disc (B), which should be about 4 inches in diameter, on to the centre of the wooden stud, so that it turns easily. You will now require either two brass protractors, or a cardboard circle having degrees from 0 to 360 marked on it.



The former need only be placed on the disc when required, but the cardboard had better be glued to the disc if used.

Now at the two ends of a diameter of the large disc (A) fix two pins or fine nails, and carry a piece of black thread from the one to the other right across, and over the top of disc (B). The height of the thread must be just sufficient to clear the top of disc (B). The apparatus is now ready for use, and exercises can be performed with it in the classroom, the playground, or in the open air.



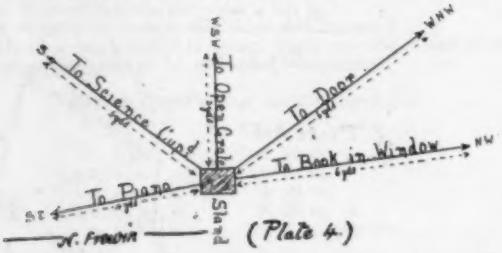
To use it, proceed as follows: (1) Sight along the two pins and thread at any object. (2.) Turn disc (B) until thread lies parallel to and above diameter of the two protractors, *and on* 0 *degrees*. (3.) Turn disc (A) round until pins and thread point to second object. (4.) Read number of degrees from 0 to where the thread lies in new position. This is the angle between the two objects.

Now, suppose that instead of angles we require direction in relation to the four cardinal points of the compass. Proceed as follows: Unscrew and remove disc (B) and place on the top of the stud a pocket compass. Wait until it is pointing due north, then turn disc (A) and sight across pins to any object. The black thread will show clearly the position of the object with regard to the magnetic north. Unless a fairly large compass is used—say one having a diameter of 1½ inches—it is better to use a cardboard disc having the cardinal points marked on it; in fact, a duplicate of the dial of a magnetic compass. Of course it would still be necessary to use the compass to set the dial to the magnetic north before sighting an object.

A very large number of exercises can be worked with the apparatus. I can only hint at one or two. Let the apparatus be placed in front of class and directed

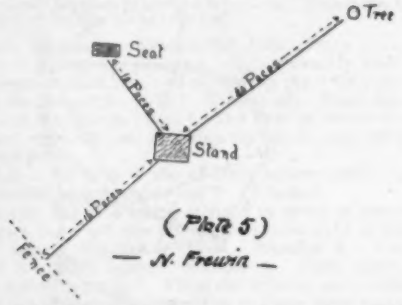
towards various objects—for example, corner of room, cupboard, window, objects on window-sill.

Each pupil will come forward, sight the apparatus,



and then return to his place and draw line of direction. From the centre of a playground a similar but more interesting exercise can be performed, while in the field there is no limit to the exercises which the apparatus affords. (See Plate 2.)

Assuming that the reader has constructed the apparatus for measuring vertical angles, as described in last article, I will now add a few hints regarding its use. In school it should be used three times each day whenever the sun is shining. The plan I adopt is this. The class is divided into sections, each of which takes certain meteorological records each day, so that in twelve months



every lad in a class of forty has recorded rain gauge, barometers, thermometer, storm-glass, direction of wind, and altitude of sun.

The latter is taken at 9 a.m., noon, and 3 p.m. The records are placed on blackboard by the boys concerned, and the rest of the class enter them in weather-study exercise book. I here show the result of a pupil's observations taken in February:—

J. JONES

DATE	THERMOMETER OUTDOOR	THERMOMETER DRY	THERMOMETER WET	WIND	BAROMETER	RAIN	SUN 9 A.M.	SUN NOON	SUN 3 P.M.	DIRECTION 9 A.M.	DIRECTION NOON	DIRECTION 3 P.M.	SHA NOON
1910													
FEB. 14	40·5°	51·5°	50·5°	S.W	20·5°	0 m.m.	41 ins	—	—	—	—	—	—
" 15	42·5°	56·5°	47·5°	S.S.W	20·2°	0 m.m.	31 ins	14°	—	15°	S.E ¼ pts	—	SSW 2½ pts	—
" 16	38·5°	53·5°	36·5°	S.E	20·4°	15 m.m.	—	14°	26°		S.S.E 2½ pts	S.E ¼ pts		—

Let me here point out that however well the apparatus is made, it will fail to give *exact* altitude. Some correction is therefore necessary. This correction can be ascertained by consulting an official table. The following will act as a guide for certain important days:—

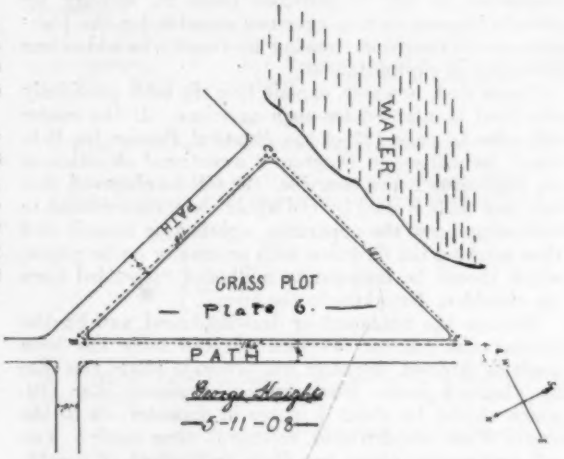
(Approximate noonday altitude of the sun [London]).

Jan. 1—15½°.
March 21—38½°.
June 21—62° (nearly).
Sept. 23—38½°.
Dec. 21—15°.

The error in the case of our own apparatus when used by a careful pupil was 4 degrees. During the winter months the records are used for making graphs and other similar diagrams. Space only forbids me showing such exercises.

For the benefit of those readers who may be quite new to the subject, I may add that under the head of "Direction of Sun" (see extract from pupil's book) the entry "2¼ points," etc., means 2¼ times 11° 15′, the latter being one compass point. It is only necessary to take one reading a week of the sun's altitude, as the altitude varies less than one degree in that time.

To obtain the true direction an allowance must be made for magnetic declination, which in London is



about 17° W. for 1910. We use a revolving dial on the stand below the apparatus described last month; but as it would take up considerable space to give a full description of how it is done, I must leave it to the teacher to devise a method for himself. The diagrams accompanying this article will give the reader some clearer idea of the scope of the exercises which may be attempted.

Plate 1c shows how to deal with a curved edge by taking off-sets from a base line. In this particular instance, the irregular edge of the "Round Pond" in Kensington Gardens was the exercise.

Plate 2 is an exercise on direction and pacing, and the objects in each case are trees. The same could be worked with protractor, the pupil taking the angle with the apparatus I have described in the present article.

Plate 6 shows the plan of a grass plot, with a portion of the edge of the Round Pond referred to above. Each is reproduced from pupil's exercise book, and bears the name of the lad whose work it is. In fact, every diagram which has appeared in those articles is the work of apupil, and testifies to the practicability of the subject.

[The Editor regrets the enforced interruption of Mr. Styles's papers, which will be continued next month.]

THE CONSTRUCTIVE MOVEMENT IN ELEMENTARY SCHOOLS.

BY ARTHUR W. BULL.

DR. OTTO W. BEYER of Leipzig, a great authority upon constructive work in schools, says that the object of introducing manual instruction into schools is not to provide a source of income for the pupils, but to subserve the education of the school. To the teacher it is a very welcome ally against idleness, for from the very nature of the work every hour won from idleness makes for moral and intellectual progress. Before formulating schemes it would be well to consider the following points :—

1. A scholar likes to make something, but his best interests are aroused if he be allowed to make something of use, especially if it be of use to himself.

2. Shall the work be performed under the direction and guidance of the teacher, or shall the scholar be left to his own devices ?

3. Shall the material used be paper, cardboard, clay, wood, or metal ?

4. The correlation with other subjects.

5. What the finished article should look like.

6. In which classes shall the work be done ?

With regard to the practical utility of the article made, we shall not be entirely in the wrong if the model be of no use at all. We could not sail the ocean in a paper model of a ship, neither would we care to sit on a plasticine model of a chair. We must not, however, discard these models as useless, and we must not ignore them even if poorly executed. Something in the ship model, surely, will illustrate the boy's idea of proportion, shape, stability. He must have exercised his mind in drawing and planning his model. The boy who makes the chair must think before he acts. However bad his work may appear on completion, he will generally recognise his errors of proportion and shape even without the suggestion of the teacher.

The models should not illustrate the expression of the teacher, but of the scholar. I once had occasion to read some dozen or so composition papers from a school in Australia. They were all different as regards the actual wording, but in every other respect they were exactly alike. The boys had evidently been bound down by severe and orthodox rules to treat the subject in an orthodox manner. The essays were painfully dry and uninteresting, and might all have been written by the same person. Exercises of this description are a waste of time, and are of little or no educational value. We expect a boy who has any knowledge of the language to use composition as a means of expressing what he sees, what he thinks, or what he feels; not what the teacher thinks, or what the book tells him. In the same way our constructive work must be a means by which the scholar can give expression to his own ideas—a means by which his own individuality will be brought out. I do not suggest that he should be left entirely to his own resources. A hint from the teacher regarding the best ways of using certain tools, or the most convenient and economical means of dealing with materials, will still leave ample scope for the pupil to express his own individuality.

Much has been said recently concerning the merits of the various materials in use for constructive work. The teacher is sometimes at a loss to know whether he shall use clay, paper, wood, or metal. If we bring ourselves down to the level of the child, and imagine we are children again, I think we shall have little difficulty in coming to a satisfactory decision. Should we like to use all our manual dexterity upon paper with a penknife or scissors ? Would it tend to the continuity of interest and to a display of keen industry to be always at work upon one material, with one set of tools ? I think not. Education should be varied if interest is to be sustained. Monotony in every subject should be carefully avoided. Hence, where possible, three or four varieties of material should be available, so that they may be used separately or together as occasion may arise.

Our choice of materials must largely depend upon the resources of the school, some being easily used in ordinary classrooms with the ordinary desks, while others require the existence of a special room fitted as a workshop. One of the cheapest articles I have seen used is *papier mâché*. Old newspapers, soaked in water for a few days, readily lend themselves, when the surplus water is squeezed out, to manipulation. It will be found inexpensive, clean, and of great use in constructing relief maps and other models. After a lesson on Gibraltar, where a plan of the rock and of the surrounding land and water has been used, together with a pictorial view of the fortress, a child would be in a position to make a relief representation of what he had learned by arranging his damped paper upon a slate or millboard. The material dries readily without cracking, and can be coloured if so desired. A twelvemonths' scheme might, with advantage, contain five or six exercises of this description, graded, of course, according to the age and standard of the child.

White cartridge-paper exercises occupy a prominent position in constructive work. They are adopted very largely in the United States schools in connection with many subjects. These exercises may consist of paper-folding for infants, the cutting of geometrical or ornamental figures in the flat, or the making of geometrical and other solids by the middle and upper classes. We may have paper models to illustrate history, geography, science; paper representations of flowers and leaves in connection with nature study. The only materials required are paper and stickphast, or some other adhesive substance. Cutting-knives, metal rulers, and scissors complete the equipment.

Cardboard, if used, should not be too heavy, as it is somewhat more difficult to manipulate than paper. Gummed strips for binding the edges and corners of the models might be made by the scholars for their own use. One of the early exercises should consist of the construction of covers for their note-books. This might be followed by the making of pen-boxes, hold-alls, and other useful objects. In this way the utilitarian aspect of the work is brought into prominence at the outset.

Clay or plasticine lend themselves to modelling with the fingers, and also serve to introduce the uses of simple tools. The exercises should be graduated according to the ability of the child, and could consist of representations in shape and bulk of fruit, vegetables, bread, flowers, and leaves, and other nature-study subjects. Lessons in shape, number, area, and bulk are also easily illustrated by the use of this material.

In using wood as our material we have a very wide scope for work. In this case special equipment and a special room will be required. The noise of the work-

shop must be considered when fixing the position of the special room. I see no reason why we should adhere to any one given series of exercises. If our exercises are graded so that we first instruct in the uses of tools, the preparation of wood, simple joints, followed by the construction of simple articles, we should have no difficulty in suggesting further exercises of increased difficulty. Wood enters so largely into the construction of articles of use in our everyday life that it forms perhaps the best material for our constructive work. It adapts itself to the construction of lightly-made models of many objects; it can be used to make useful items of furniture; or it may be used for elementary instruction in wood-carving.

For metal-work special tools and machinery will be required. The variety of work executed must depend largely upon the resources and nature of the workshop. It may consist of wire-work, scroll-work, filing, drilling and tapping sheet-iron, or making various metal fittings. Metal embossing and chasing may better suit the requirements of some schools.

Having briefly reviewed the materials, our attention must next be given to correlation. Undoubtedly, constructive work may easily be associated with some subjects in the school curriculum. We may most readily arrange a scheme of arithmetic which will have its practical exercises and its constructive exercises. Similarly, manual work may be used to assist our science, history, and geography; while a little further thought will enable us to include English and nature study in our list. If we are, however, to look upon this correlation in its broadest sense, we should not restrict its limits to the school time-table, but to the whole of the child's associations during its working hours. It may perhaps answer our purpose better, as teachers, to only introduce such constructive work which will have an influence on the scholar's ability to do other scholastic work; but from the scholar's point of view, and also from an educative aspect, to include other interests and other occupations in our list of those which are to be illustrated by constructive work will not only widen our scope, but will enable us to have a more continuous influence over the child's welfare. A boy's interests are not exclusively in connection with his school. An intelligent boy takes a keen delight in external affairs. He has a home, which forms a potent factor in the formation of his character. Holidays come along occasionally, during which he may travel. The industries of the district, or in which his relatives are engaged, the town in which he lives, the amusements he indulges in, all serve during their own time and place to provide objects upon which a healthy mind will concentrate itself.

With all these widely divergent interests, the multiplicity of materials, and the many differences of opinion, we may get somewhat confused; but we shall never have an opportunity of getting dull in our constructive teaching. If our work is to develop the mind in many directions, and not to be restricted to the narrow limits provided by the old-time methods, our correlated scheme will not be solely paper-modelling and mathematics, or woodwork and science, or any one couplet of subjects, but will be, broadly, constructive work on the one side, and everything else on the other.

(To be continued.)

Nelson's "Alert Arithmetics" correlate Drawing and Number work.—*Advt.*

EDINBURGH SCHOOL BOARD'S EMPLOYMENT BUREAU.

PROGRESS OF THE WORK.

IN September last year Edinburgh School Board established their Educational Information and Employment Bureau, and the monthly reports of the Director, Mr. M'Nally, which have been submitted to the Bureau Committee have shown that the Department is making remarkable progress. Children who have reached the age of fourteen may leave school on two dates —March 1 and September 1. Those who attain the age of fourteen after March 1 cannot leave until the later date, which means that if they intend quitting school life they do not return after the summer vacation. The few weeks immediately preceding March 1 and the commencement of the summer holidays are, therefore, the periods when the pressure of work is most severe upon the Bureau officials, and last month has been a period of great strain upon the Department.

From reports which were placed before the Committee on Wednesday it appeared that no fewer than 1,261 children were entitled to leave school at the beginning of March. As many pupils as possible are induced to stay at school until the end of the session, but it is expected that from 800 to 1,000 will leave this month. It is for the benefit of such children that the Bureau was established, and a systematic plan of making the institution known to parents and employers has been adopted, with results which the Board regard with great satisfaction.

The Bureau may be said to have two functions—(1) To collect information relating to trades and occupations, circulate the facts among parents of children who are entering the working world, and assist parents to select the occupations for which their boys and girls are most fitted; and (2) to bring candidates for situations into direct contact with employers who are seeking young workers and apprentices.

During the period from September 6, 1909, when the Bureau was opened, and the end of last month, 2,104 pupils left school, and cards concerning them were received at the Bureau. Of this number 842 were dealt with in February alone, 1,419 intimated that they intended to enrol in continuation classes. Personal application for employment has been made to the Bureau since it commenced in 300 cases (130 of which were dealt with last month), and 162 of the applicants have been placed in situations by the Bureau (39 in February). Last month 37 employers intimated 84 vacancies to the Bureau, and over the whole period 149 vacancies have been intimated by 82 employers in the city.

To those who interest themselves in the lines along which the development of continuation schools may proceed, the relation of the Bureau to the continuation classes is significant. No opportunity is lost by the Director of impressing upon the pupils and their parents the value of the continuation classes.

When a boy or girl leaves school a card is filled up by his headmaster and teachers, and forwarded to the Director of the Bureau. It gives the standard of education to which the pupil has attained, particulars concerning his or her behaviour, and attendance at school, general physique, sight, and hearing, and the occupation which the boy or girl desires to follow, in regard to which the pupil consults his or her parents. If an arrangement has been made with an employer, particulars are given on the card, which sets forth also the opinions of the headmaster and the teacher as to the kinds of occupation for which the pupil is fitted by natural bent and educational equipment, whether the pupil desires to be enrolled on the Bureau register, in what continuation school the pupil proposes to enrol, and for what course of instruction. A smaller card, with most of these particulars recorded upon it, is given to the pupil for presentation to a prospective employer. The Director is enabled to get into and to keep in touch with the pupils and their parents. He is consulted by fathers, mothers, and guardians who are anxious to be assisted in the task of selecting occupations for the boys and girls, and in addition to this duty Mr. M'Nally is able to advise them concerning the course of specialised instruction in the continuation schools which are calculated to benefit most the particular case.—*The Scotsman, March 5.*

Voluntary Continuation Schools a Failure!

THE GREAT EDUCATIONAL GAP.

BY JOHN PERKINS.

IN previous papers I have endeavoured to sketch in outline a curriculum for the ordinary elementary school, but I must admit that the suggestions I have made will, to a large extent, be wasted unless we can follow up this groundwork by some effective system of post-elementary education. In the first of these papers (page 564, May 1909), I ventured to assert that "if there is anywhere a breakdown in our educational system it is at the age of exemption for compulsory attendance at school." When the child reaches the age limit, "generally speaking—and universally so far as the State is concerned—he may do as he likes, and go where he will, until, possibly unemployed and unemployable, he once again falls back upon the State, and in one form or another endeavours to obtain relief." Folk continue to unburden themselves about the unsuitability of the curriculum of the elementary school, and we have enactments to provide for the unemployed workmen, but we still hesitate to institute State control during the years which fall between the day school and those of man's estate.

When some great publicist comes into the light and fixes public attention upon the problem, maybe some Cabinet Minister will be sufficiently bold to undertake a really useful piece of social constructive work, and will essay to produce a remedy for the evil. The feeling that

Our Educational System is Defective

is fairly general, but the future citizens of the nation continue to suffer from the consequent disease, although remedial and preventive measures lie ready to hand. Meantime those whose business it should be to apply the obvious remedy gorge us with reports and statistics—and prefatory memoranda—without end, and we get no "forrarder." It would be amusing were it not pitiful.

The report of the Poor Law Commission, published more than a year ago, was emphatic in its recommendation to extend the school-leaving age, and to make continuation classes compulsory. The expert witnesses who appeared before the Commission were clearly of opinion that the present system of voluntary evening schools and technical institutes was unsatisfactory. Take the available figures, and in round numbers we find that out of the nearly three million children from 14 to 17 years old inclusive, not more than 350,000 are receiving any education at all; and this when we include the scholars of these ages in attendance in elementary, secondary, and technical schools and continuation classes, pupil teachers, and student teachers, and making also an allowance for those who do not come under Government supervision. Of these, 200,000 or so are on the register of evening classes, and their attendance, as we know only too well, is often very perfunctory. But taking it at its best, out of every eight children of 14 to 17 years of age, only one is under educational influence of any kind.

Even if the instruction were effective, this would be sufficiently appalling, but most of those who have any experience of the work will admit that the results of voluntary evening school work in general are disappointing and disheartening.

Let us turn for proof—if proof be needed—to Professor Sadler's evidence before the Committee:—"The present condition of the evening continuation schools in many parts of England is disappointing. In the Manchester University Inquiry seventy-nine experienced evening school teachers and administrators answered a series of questions on the subject of evening-school work. In answer to the question whether the evening continuation schools were doing, on the intellectual side, work commensurate with the labour and funds now devoted to them, thirty-seven replied in the negative, and thirty-three in the affirmative. In answer to the question whether the evening continuation schools were doing, on the moral and social side, work commensurate with the labour and funds now devoted to them, thirty-three answered in the negative and thirty-five in the affirmative. As the replies came from all parts of the north of England, and from many districts in the Midlands and South,

"THESE REPLIES SHOW WIDESPREAD DISSATISFACTION AT THE INTELLECTUAL RESULTS ORDINARILY OBTAINED IN THE EVENING CONTINUATION SCHOOLS.

"Those who answered the questions had on the average between seven and eight years' experience in teaching in evening schools."

The tendency of other evidence is in the same direction. Professor Sadler went on to cite the causes for "the more serious defects in evening-school work":—

"1. Many of the teachers engaged in evening-school work have already been engaged in long hours of service in the day school.

"2. Great numbers of young people are employed during such long hours during the daytime that they are too tired to undertake serious intellectual work in the evening school.

"3. In the country districts, reasons of expense make it difficult to provide the necessary variety of instruction, especially of a practical character.

"4. In many places little has been done to link the evening classes with the work of the day school in such a way as to encourage the pupils to come to the evening schools on the conclusion of the day-school course.

"5. There is much wastage of ability and of character during the few years which generally elapse between the close of the day-school course and the taking up of evening-school work. . . . Thus, inquiries which begin at opposite ends of the line lead to one and the same conclusion—namely, that *the years between thirteen and seventeen are the point of educational leakage.*"

Let us admit that the agencies which exist are better than nothing; that they give opportunity for some instruction to those who are keen enough to seek it; that they keep some young people profitably employed and out of the streets; but take it all in all, we are at present only playing with the question. The voluntary system fails to touch those who most need the moral, educational, and physical advantages of the continuation school.

We cannot Afford to Continue this Philandering.

The remedy should be as bold and drastic as it is necessary; the results will justify the means.

Professor Sadler plumps for compulsion, because—

"1. Our present system of attendance in England is educationally wasteful. . . . By means of a prolonged course of suitable education, adaptiveness of mind and firmness of character can be enhanced. But the continuation classes for young people during adolescence should be held, as far as possible, during the daytime, to avoid overstrain.

"2. Wherever compulsory attendance at continuation schools has been tried in England, whether for boys or girls, it has been found practicable and beneficial. Compulsory attendance at continuation schools has been tried in Germany and in Switzerland, and with satisfactory results."

Among other witnesses, he had Mr. Cyril Jackson and Mr. Bray in whole-hearted agreement. Said Mr. Bray: "Any remedies adequate to the evil (of uneducative juvenile labour and unemployment) must satisfy at least two conditions. On the one hand, the control of the State over the boy must not cease abruptly at the age of fourteen; and, on the other hand, facilities must be given for a continuation of the boy's general education, and in particular for industrial training." Mr. Bray further argues that what is good for the children who come under the Industrial Schools Act, who may be retained to 18, and for the mentally and physically defective, whose attendance may be enforced to 16, is more necessary

"TO PREVENT THE EFFICIENT CHILD FROM BECOMING AN INEFFICIENT MAN."

So far so good; but how is it to be done? Mr. Bray suggested a half-time system:—"If we are anxious to provide effective training, and at the same time to limit the hours of employment, we can gain our end only in one way. We must have the boy in school during a portion of the working hours. I suggest, therefore, that we should establish a new system of half-time. The control of the public educational authorities over the boy must not be allowed to close abruptly at the age of fourteen, but must be extended till the lad reaches the age of eighteen. . . . The aims of the school would be threefold—it would enable the boy to continue his general education; it would provide a course of physical exercise and gymnastics; and it would supply a proper industrial training."

He urged as advantages and features of this proposal:—

"1. Attendance would be enforced in the same manner as in the elementary schools and by the same officers.

"2. Medical inspection would be continued.

"3. We should obtain a better return for the expenditure on elementary education. The gain in intelligence would be no less than the gain in character. Tastes and interests would be well developed, and the additional instruction would ensure the possession of greater intelligence, power of thought, and adaptability.

"4. Manual and technical teaching would play a large part.

"5. Four years' additional schooling would give an opportunity for any special ability on the part of the boys to show itself."

(*To be continued.*)

EDITOR'S NOTE.

The above article was in our hands some weeks before the N.U.T. Conference, at which the points dealt with were emphasised in the papers read by Sir H. Hibbert and Miss Adler dealing with the proper treatment of the adolescent.

SUMMER COURSES ABROAD.

AMONG the signs of the advancing season are the programmes of summer courses which have come to hand. The courses at Jena differ from others by the length of time they have been established, their appeal to students of all nationalities, and the variety of courses they offer. They also differ in the fact that the whole of the highly subdivided courses in natural science, education, school hygiene, theology and religious instruction, philosophy, history, political economy, languages, and literature are compressed within the period of a single fortnight—from August 4 to August 17. The popularity and usefulness of the courses are testified to by the fact that last year six hundred and sixty students took part in them. The fees for the courses are very modest indeed. They range from five marks to fifty marks. Students attending the courses can obtain full board and lodging for about twenty-five marks weekly. For programmes and further information apply to Fraülein Clara Blomeyer, 4 Gartenstrasse, Jena.

The Teachers' Guild are again providing language courses at Honfleur in France, Neuwied and Lübeck in Germany, and Santander in Spain. Each course occupies not less than three weeks, commencing with the first week in August, and deals with the language, literature, and life of the country. The course at Neuwied is only literary, but at Lübeck those students who desire it may obtain instruction in commercial German. The teaching is good and practical, and participants in the courses may present themselves for an examination in the language they have been studying. The local committees abroad secure comfortable and cheap lodgings for students, who are recommended by preference to stay with private families rather than at hotels. During the continuance of the course the mornings are devoted to study, and excursions are arranged for the afternoons, while meetings of a social character are held in the evenings. The fee for a course is £2, 2s., with a reduction of 5s. to members of the Guild. Further information can be obtained from the Secretary of the Teachers' Guild, 74 Gower Street, London, W.C.

The University of Dijon has for some years been offering special opportunities to foreigners to acquire a good knowledge of French in its conversational, literary, and commercial aspects. During the last university year two hundred and thirteen foreigners were enrolled, some remaining the full university year, and others taking holiday courses extending from one to four months. The circular sent us is not clear on the point of the date when the holiday courses commence, and we should advise those who desire further information to write either to M. le Recteur, de l'Université, Dijon, or to M. le Professeur Lambert, rue Viollet-le-Duc, Dijon. The fees range from thirty francs for one month to sixty francs for four months. A Comité de patronage des Etudiants étrangers arranges for suitable accommodation for those who take advantage of the holiday courses, and by means of excursions to points of interest in the vicinity endeavours to make the stay of students enjoyable.

The holiday courses at Versailles are now in their fourth year. They offer a very full programme of instruction in the language, literature, history, art, and life of France, and afford students an opportunity of testing the progress they have made by presenting themselves at the conclusion of the course at an examination for either an elementary or for an advanced certificate. The social and recreative sides of these summer gatherings are well catered for, and visits are arranged to the chief galleries and art manufactures of Paris, and to such interesting places as Rambouillet, St. Germain, and Pont Royal. The first series of courses extends from July 27 to August 18, and the second series, arranged on the same lines, but prescribing different books for study, from August 19 to September 10. The fees are sixty francs for one course, and a hundred francs for both courses. Ladies can be accommodated from July 26 at the Lycée de Jeunes Filles, 9 Avenue de Paris, Versailles, at an inclusive charge of six francs a day. For the same terms gentlemen can get full board and lodging at the Ecole Jules Ferry, 38 rue de Satory, Versailles. Full programmes can be obtained from Mlle. Allégret, Directrice du Lycée de Jeunes Filles, 9 Avenue de Paris, Versailles.

THE IMPROVEMENT OF ATTENDANCE.—This is a matter which closely concerns the success of every school, both educationally and financially, and all head-teachers will be keenly interested in the manner in which the principal of an Irish school kept a clean bill of health among his pupils for the space of twelve months. This is fully described in a letter to the Sanitas Company, Ltd., of Locksley Street, Limehouse, E., which can be obtained on application at this address.

Our Art and Handwork Section.

COLOUR WORK IN SCHOOL.

DRAWING WITH CRAYONS.—III.

BY J. YOUNG, GLASGOW HIGH SCHOOL.

FOR those who have facilities to do work of a more advanced character than that given in the two previous articles, pastel still provides a good and ready medium. Nothing of a very ambitious character can be attempted when one is restricted to the usual school period of forty-five or sixty minutes for each study; but where classes are of reasonable size, and groups of leaves, flowers, or other objects for study can be arranged and left undisturbed so that pupils may return to them from day to day, then better work on a much larger scale can be done. The illustration given below —a study of a violoncello—is the work of a continuation class student putting in six hours per week at drawing. He has chosen a point of view which makes this study a very difficult one, so far as drawing is concerned. There is nothing startling or brilliant in the way of colour contrasts, so that also means very careful and delicate work in shading and painting to strike correctly the fine gradations of tone and colour which bring out the modelling of the surfaces of the object. The detail work of the head coming forward in such acute perspective is in itself very difficult drawing, requiring much searching and sound judgment of proportion. It is so easy to get the result like a badly-focussed photograph, only the error is generally made the other way. The camera enlarges the near portions unduly, while a student striving to guard against this misses the necessary enlargement, and draws the detail to a scale that would be all right if the object were not foreshortened at all. Musical instruments provide us with quite a large variety of good studies for crayon work. All the stringed instruments from the piano down to the banjo, drums, and the wind instruments of wood or brass, are fairly picturesque, and many of them make good disciplinary studies in drawing and colour as well. There is a wealth of colour in the varied reflections of a brass

A Study of a Violoncello.

euphonium or a copper bugle. The present example was done on an imperial sheet of fairly dark-toned paper. This is a good size for the more advanced work; it gives more freedom in the handling of details, and the rather blunt points of the crayons do not then feel too big for the work. The object chosen is of sufficient difficulty in itself, and does not necessitate the dragging in and elaborate arrangement of accessories to form a pictorial composition. Evidently that would be the next development if we wished to make the exercise more difficult, or to work the result into something more of a picture. This sort of thing should, of course, be encouraged, especially where it is the spontaneous effort of the student himself. It is a good practice to occasionally make the student select his own models, arrange the group, and make choice of his own view-point. Too often all this is done for him by the teacher, who thus robs the student of much valuable practice which he ought to have under the teacher's guidance. When the classes are not large all this can be done very easily, and it makes the work more interesting to all concerned. It would be well also to enlarge upon the great beauty of a chance combination of objects, and to encourage students to take advantage of such when they occur. Often enough the chance comes from the careless setting aside of vases and pots near the sink, on the floor, or when stowing them away upon a shelf or bracket. Every opportunity of this kind should be taken advantage of; the result is never so stiff and formal as it is when the objects have been specially arranged. In all studies of this kind the natural background, no matter what it may contain, must be accepted as part of the picture.

There is a plentiful supply on the market at present of inexpensive vases, having good form and colour. These, with the usual accompaniment of flowers, fruit, or dried grasses, make excellent material for study, and as models for arrangement into groups which harmonise in line and colour, whether the student actually copies the group or not. There are two examples of what I mean in Plate II.

For the series of studies comprising flowers, fruit, shells, feathers, birds, etc., the pastel is still eminently suitable, but it requires a fairly extensive palette. The six, nine, or twelve colour boxes in general use in schools are certainly not sufficient to give the delicate colours which we find in these natural specimens. Much may be done with the ordinary box; but it is very awkward to begin an interesting exercise, and find that you have no red or no yellow which will give you the true colour value of the object before you, no matter how you try to blend the various tints. For those who attempt more ambitious work an extended range of colours is recommended, and these can very easily be obtained from any artist's colourman at reasonable prices.

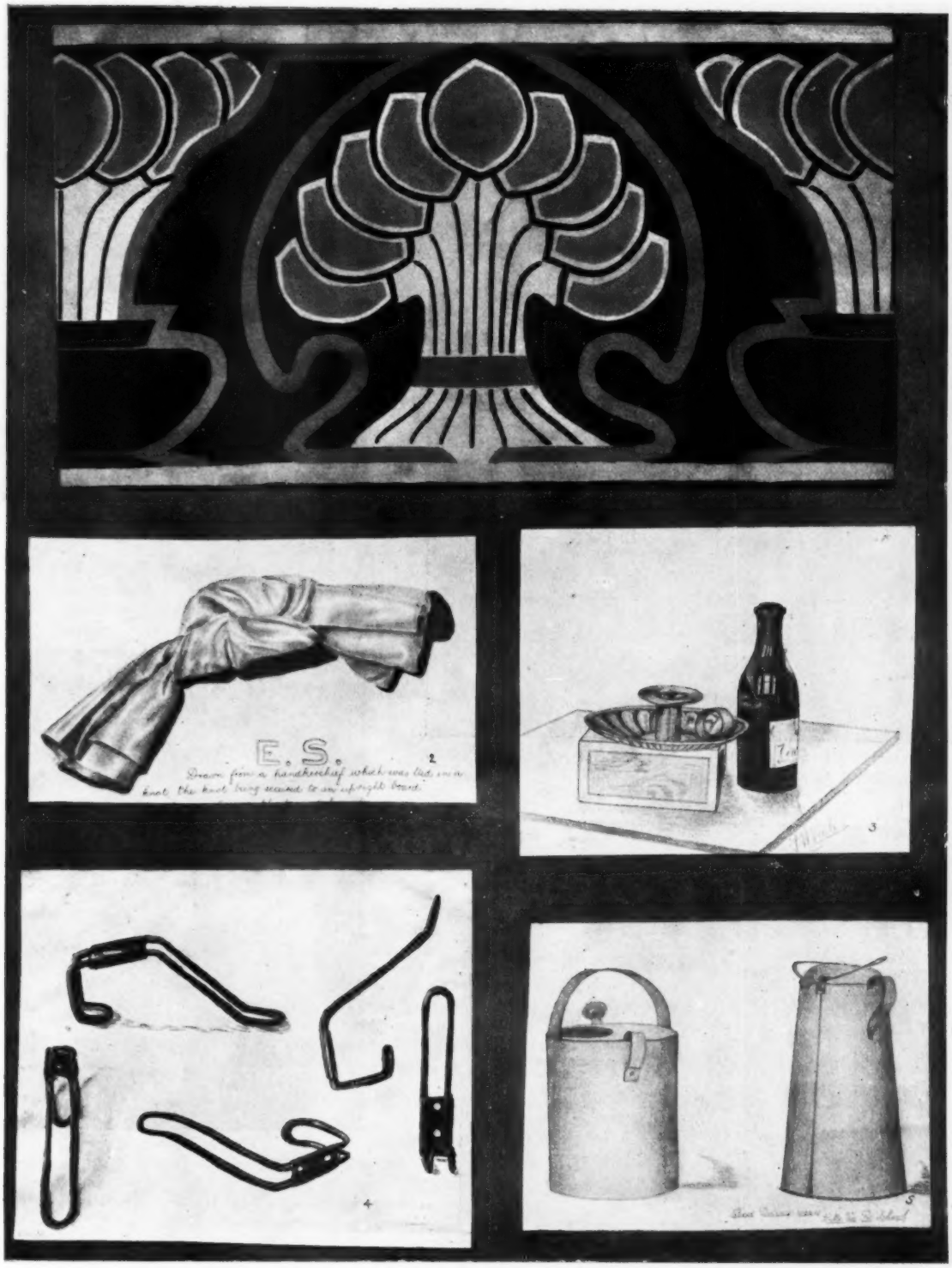
As the student proceeds with these studies he ought to feel himself getting into sympathy with certain colour arrangements and certain methods of work; in short, he ought to begin to strive after a style of his own. The methods of his teacher may no longer answer; very likely they will be quite inadequate for him if he is honestly striving to give expression to his own ideals. This is difficult for the teacher, but he may find it necessary sometimes to encourage the student in methods which are directly opposed to his own. So long, however, as he is convinced that it is a conscientious effort to state the truth, both student and teacher are upon safe ground. Once you have got a little command over the medium by practice, do not be frightened to break away in honest experiment. The timid ones never get beyond the servile imitation of their teacher or chosen leader. A copyist only is not a very high ideal in any branch of art, but remember that originality is not to be found in false statement or insincerity. The truth alone tells, and that you must get to feel and know intimately by long and earnest searching. What you make of it, and how you will state it, is then a question for you to solve. For this purpose you ought also to study the work of others, especially work done in the same medium (this does not necessarily mean copy it); the most original work comes from the man who is intimate with all that has been done before. Do not forget that the student sitting next you may teach you many valuable things. He may be the awful example, and show you what to avoid; but he also may be a very good example, and show you what to emulate.

It is impossible, where space is a consideration, to illustrate fully the range of subjects suitable for crayon work. In most schools, primary or secondary, there is generally a fund of material ready to hand in the fitments, cupboards, equipment of laboratories, gymnasiums, etc.; then the view from the windows, bits of the playground and outer buildings, the boy or girl sitting next to you, your own hand, somebody's coat, hat, and gloves carelessly flung on to a chair or table, are all things which may be attempted during the ordinary lessons. Then, as a special sketching lesson or memory exercise, such things as museum studies, studies at the Zoo, farmyard, orchard, or garden, a grocer's or confectioner's window, and many others of a like nature, will suggest a range of subjects from which any one will be able to select something suitable. Very few have tried the honours page with pastel drawings as yet, though I feel sure they stand a very good chance of winning prizes.

The two flower studies reproduced are from drawings done in the classes held for the further instruction of acting teachers. Each lesson is of two and a half hours' duration, and a new model is given for every lesson. These are therefore time studies.

I do not think that crayons have yet received a fair trial as a medium for school use. As things are at present, they will be found more useful in the junior classes than in any others. When it becomes a question of finding the path of least resistance in the search for truth of representation, it is indeed very difficult to make a choice—there are so many things to take into consideration. Yet each medium has its merits, and the teacher of any class, senior or junior, will find much to recommend crayons for teaching children how to appreciate colour in all that surrounds them in this life.

We hope to give some hints in the next paper to show how useful the crayon box may become as an outfit for sketching from nature.



HONOURS PAGE.

COLOUR WORK IN SCHOOL.

HONOURS PAGE.

THE prizes this month go to—

1. Lily Keenlyside (16), Secondary School, Jarrow-on-Tyne.

2. E. Stenner (15), Wesleyan School, Gillingham, Kent.

3. Fred Veale (14), St. Margaret's Higher Grade School, Prince's Road, Liverpool.

4. Allan Gornall (14), Sulyard Street School, Lancaster.

5. Albert Davey (10), Belle Vue Road School, Leeds.

The following pupils' work is also worthy of commendation:—

Josephine Sturt (14), The Welsh High School, Ashford, Middlesex; Gertrude Hughes (13), The Welsh High School, Ashford, Middlesex; Katharine M. Jenkins (13), The Welsh High School, Ashford, Middlesex; Joseph A. Griffiths (15), Wesleyan School, Gillingham, Kent; S. Parker (13), Wesleyan School, Gillingham, Kent; Arthur J. Wragge (15), Wesleyan School, Gillingham, Kent; Joseph Guy (12), Beith Academy, Ayrshire; John Wilson (13), Beith Academy, Ayrshire; Charles Dutton (13), St. Paul's Cray School, Kent; N. Nicholson (11), Belle Vue Road School, Leeds; George Smith (11), Belle Vue Road School, Leeds.

The months of March and April have not brought in the number of examples of budding twigs that we looked for. Lilac, sycamore, and horse-chestnut will supply excellent studies in outline, light and shade, and colour.

N.B.—The conditions of this competition are exceedingly simple, and yet they are violated over and over again every month. We can only conclude that such competitors are not genuine readers of the paper, and in future all such work will be put aside.

Intending competitors please note that—

1. Drawings must be *packed flat*.

2. The full name, age, and school address must be written *on the back of the drawing*.

3. Drawings must be original, and not copies from any source, however good.

4. We cannot undertake to return drawings sent in for this competition.

They may be sent at any time addressed to J. Vaughan, 7 Campside Crescent, Langside, Glasgow.

A GREAT FLORENTINE ARTIST—SANDRO BOTTICELLI (1444–1510).

BY W. E. SPARKES.

IT was the fate of Sandro Botticelli to be the foremost artist in Florence; to have a rich and powerful prince for his friend and patron; then to be utterly forgotten for more than four centuries; and, lastly, to come once more into his own within these last few years.

The history of art is full of these strange changes and chances: a dead eclipse has obscured many a famous name; and though time appears to judge strictly in most cases, he would be a bold man who should accept even time's verdict as final. Already, with this new-born interest in the early Italians, such as Fra Angelico and Botticelli, one sees a marked tendency to put a slight upon names that for the past three hundred years have held unquestioned sway in art.

Why should Botticelli's fame have become so suddenly obscured? The reason is not far to seek. Ten years before his death in the year 1510, a new sun began to rise; and as it rapidly moved to the meridian all former lights in art began to pale, until, like stars at noonday, they were unseen and forgotten. Michael Angelo became the last word in art; in presence of his tremendous works, Botticelli and many another were pushed almost contemptuously aside, and as his fame grew throughout the years theirs dwindled and died away.

During the next four centuries all art was run in the heroic mould first fashioned by Michael Angelo. Until quite recent times the most famous critics, comparing his marvellous frescoes and sculptures with those wrought before his time, could hardly find words to express their sense of his greatness. As for Botticelli and the rest, one might tolerate them for their quaintness and daintiness; but beside Michael Angelo, their works bore the aspect of those tiny Tanagra terra-cotta figures compared with the gold and ivory statue of Minerva, forty feet in height, the proudest work of the greatest Greek sculptor Pheidias.

The Tanagra figures are charming, graceful, naïve, but hardly to be considered as serious art. Botticelli, said the critics, was pretty and interesting in the history of art, but not to be mentioned in the same breath with Michael Angelo, Raphael, or Leonardo da Vinci.

Yet this later art arose naturally from the earlier: the connections can easily be traced. Raphael would have been impossible if Fra Angelico and his school had not laid the foundations; and modern criticism, represented by Ruskin and the pre-Raphaelites, have gone far in their endeavours to prove that the farther art advanced the less noble it became, and that Michael Angelo marks a decline rather than an advance in all the finer qualities.

They said that sincerity perished—that men no longer looked upon their work as a means for expressing their deeply-felt convictions, but merely as an exhibition of their skill and cleverness. No doubt this protest of the pre-Raphaelites did good in its day, and no doubt, too, art has gained enormously by a restatement of what should influence all sincere schools; and if it is now felt that the case was overstated (as it was bound to be in the circumstances), the world has at least learnt to look once more with deep interest upon the paintings of such a forgotten genius as Botticelli.

SANDRO BOTTICELLI AND FRA ANGELICO.

As with all great artists, Botticelli is notable both for his personality and his art; indeed, the former often explains the mould in which he cast his works. The gentle Fra Angelico, dwelling for ever amidst heavenly visions, painted angels and Madonnas, without a touch of sadness, victorious, and free from doubt. Separated from the world by his monastic vows, he passed along the quiet valleys where storms never came, though he could hear them rumbling in the distance; he painted serenely while all Florence was torn with discord. In his low retreat the meadows were decked with innumerable flowers; the smooth streams slid with a pleasant murmur over the stones. There was nothing strenuous

in such a life, passed with an entire devotion to the service of his Church and absorbed in his art. The noisy world was beyond his borders; the frequent riots and fierce contentions which continually disturbed Florence were like idle sounds, full of sound and fury, signifying nothing. The world had no rewards for a man vowed to poverty and humility. Yet he was alert to all the subtle changes which were quietly altering the life about him. That new-born eagerness for learning, and particularly that love for ancient things—the myths and arts of Greece—could not leave so sensitive a man unmoved; and, as has been pointed out,* he showed in his paintings how greatly he admired this revived learning.

Sandro Botticelli was born at a time when this fevered admiration for ancient learning was the ruling passion in Florence, then the most cultured city in the world. Art had advanced many degrees in skill since Fra Angelico's day. It was fuller; it touched life at many more points; it was no longer bound up almost entirely with the Church and under its patronage. Perhaps it is not too much to say that this intense love for pagan learning, for Greek myths and ancient poetry, had partly eclipsed Christianity, since, only a few years later, an amazing revival arose, led by that wonderful preacher Savonarola, who called passionately on men to break themselves free from the deadening influence of false knowledge, to burn their Plato and read again their Christian fathers.

But this was not yet come to pass. Botticelli was living in that new time when the great and powerful family of the Medici ruled Florence; and when, under Lorenzo dei Medici, himself a scholar and poet as well as a warrior and politician, the city's increasing trade attracted merchant princes, who reared palaces along the Arno; while the rewards held out by Lorenzo drew, as within a magnetic circle, the keenest intellects and particularly the choicest poets and most imaginative artists.

Botticelli was a Florentine of the Florentines. He lived in no cloister; and although, as we shall see, he was a man to be deeply moved by religion, in his younger days he had troops of friends among the intellectuals who surrounded Lorenzo, and whose chief aim was to revive and sustain ancient art and literature. Of course, the Church was still powerful, but she had been pushed somewhat aside in the new movement. Still, we find Botticelli and many another engaged in painting frescoes for churches, while at the same time the merchant princes and richer scholars gave commissions for painting pagan pictures—the stories of Hercules, Mercury, Mars, and Venus.

It was a very vigorous and stirring time, moving with a buoyant step. The clever but excitable city was alive with all this new-born eagerness for ancient things, and particularly with an intense love of natural beauty, which they found in its highest form idealised in the Greek sculptures preserved from old times or dug up from the earth.

Botticelli in his Earlier Years.

We see Botticelli heartily in sympathy with this new learning. He spent his early years with that turbulent but clever painter and priest, Fra Filippo Lippi; but it was not long before he was working independently.

His early pictures were painted for the Church. Before long, as his fame increased, he was employed by the princely houses, and at last by Lorenzo dei Medici himself. There was at that time a strange partnership between poets and painters. The poet would give delight to some wealthy patron who, charmed with his dainty allusions, sought to have them fixed before him in line and colour. Botticelli seems often to have acted in concert with poets. It seems a strange thing in these days, when we are accustomed to think of the artist as an independent man working out his own ideas; but, in Florence, even the Magnifico himself discussed the points of a picture before it was painted.

And as angels, martyrs, and heavenly visions seldom entered into these discussions, but rather poetical fancies and old myths, we find Botticelli engaged in painting symbolical figures, such as the Seven Virtues; Prudence, Temperance, Fortitude, and the rest being represented as human creatures, with such marks in their dress, or in their bearing, or in their countenance, as to make the painting a complete poem in itself.

Then think again of Botticelli's well-known and highly poetical picture of "Spring." Here the ideas were not his, though, of course, the embodiment of ideas in line and colour is as great an accomplishment in either case, whether the original sprang from the artist or the poet.

In this case Poliziano, the Florentine poet, had described the court of Venus, and Botticelli closely followed the poem. Spring advances, a tall and eminently graceful girl in a flower-embroidered robe, holding in her up-gathered draperies a mass of flowers, which she scatters as she walks. Behind her, Flora, goddess of flowers, hurries along, dropping rosebuds and anemones from her lips, at every breath a flower; whilst Zephyr, blowing warm gusts from his lips, eagerly follows.

On the other side of the picture, the Three Graces dance lightly on the grass, which is thickly enamelled with daisies; their rhythmic movement and stately grace are finely expressed; their sober countenances have just the hint of a smile, but no more. Before them, the young god Mercury drives away Winter and his storms, while hovering overhead is young Cupid aiming his dart.

No picture could give a clearer notion of the spring and upgrowing of the new learning which had captured all the bright intellects in Italy. The world was become young again; the air was gentle, and flowers broke under the feet everywhere—flowers of poetry and painting, new growths of ancient thoughts which had never, and could never, grow cold. It pleased these brilliant Florentines to see themselves in this light; ancient Greeks, as it were, in their love for beautiful and graceful things, and yet modern Italians in their display of wealth and magnificence.

Even when Botticelli was commissioned to paint an incident from the sacred stories, he sometimes showed his Florentine spirit in what would now be considered a strange way, though it became common enough in and after his time.

For instance, he was fond of one subject, "The Adoration of the Magi," which must have appealed particularly to an artist whose skill in grouping, masterly knowledge of drawing and colour, powerful portraiture, and gift of expressing character could all be combined in great variety in such a theme.

He painted this subject again and again, always in a new way. One, painted probably about 1476, shows the Mother and the Child raised high in the picture.

* See "Fra Angelico" (*Practical Teacher* for March).

"The Head of the Madonna" (Botticelli).

In front kneel the three Magi, offering their gifts. They are, however, no Eastern kings from afar, but Cosimo and his two sons, three of the most famous members of the house of Medici. Standing on either side of this group is a prince in whom modern criticism recognises Lorenzo dei Medici and his brother.

And then the group of attendants on the right and left are no fanciful Asiatics in barbaric costumes, but the philosophers, politicians, poets, and artists (among them Botticelli himself) who were closely attached to Lorenzo's court. It was perhaps a strange note to strike. There had been innumerable "Adorations" painted; but the attendants at the scene, when they are evidently portraits, are for the most part ecclesiastics, bishops in company with patrons of their Church.

However, in this painting the Church would have seen nothing wrong in what might at first sight appear to be a pagan rendering. For was not the most powerful family, the Medici, as well as the most learned Florentines, pictured as humble in the presence of the Founder, to whom they offered rich gifts?

One is not surprised to find this picture bringing Botticelli into close favour with Lorenzo, or that his fame spread rapidly. He was now busily engaged in painting secular and sacred subjects, turning easily from one to the other. Already even in his "Spring" and "Three Graces," one sees that sober air which afterwards became deepened into more than sadness; the many Madonnas he painted have a gentle, brooding look, but by no means deeply marked with care.

The "Head of the Madonna," reproduced in this number, belongs to this earlier and happier time. The quiet soberness of the expression has a thoughtful and half-sad cast which reflects the painter's own personality. We see him looking with interest out of the picture ("The Adoration of the Magi") in which he painted his own portrait—a tall man with black curling hair, with a pair of keen deep-set eyes looking out from a strong face, evidently an intellectual force in Florence, and a leader in all the movements whether artistic or civic. This thoughtful, somewhat melancholy, man was not likely to paint any but pictures which demanded thought. His keen eyes saw far beneath the surface, and he had the supreme power, perhaps the greatest of all, to give soul and depth of feeling to the faces he painted on his canvas. They amaze us with their intensity and life; they are steadily observant, and though they keep their thoughts to themselves, these men and women reveal their character and give us more than a hint as to their mode of life. This gift is one that particularly marks the great artist. Botticelli's knowledge and technical skill are things quite apart from this supreme excellence.

Botticelli's Later Life.

We have seen the successful artist, courted by the richest, encouraged by the most powerful, looking with his strong eyes upon a strange world. Never probably given up to gaiety (his pictures would hardly support such a view), an event occurred which was destined to put a mark upon his work, so evident that when one casually thinks of *a Botticelli*, it is to call up to mind a sadness beyond what is commonly to be found even in "religious" pictures, so called.

It came about in this way. In 1489, when Botticelli was in his forty-fifth year, a secret dissatisfaction with life spread through Florence—a dissatisfaction which was perhaps the natural reaction after the light gaiety and concern for luxury and beauty which had been the mainspring of the pleasure-loving Florentines.

At length this uneasiness found a voice. Carlyle has said somewhere that the great man always makes articulate what men have only dimly felt, but what they recognise instantly when it is put before them in definite form. Fra Girolamo Savonarola began to preach in the church of San Marco. His message found hearers among rich and poor, learned and ignorant alike. Poets heard him with deep approval. It is said that the young Michael Angelo was among his followers, and the deep earnestness which always marked the artist's tremendous frescoes and sculpture may well have had its origin in Savonarola's preaching. A letter exists written by him to Botticelli, the cover of which bears the mystic word *Christus*, the watchword of the Frate's followers. Savonarola called men back to consider Christianity—to free themselves from the charm which pagan writers had thrown about the intellects of scholars and poets. He frequently addressed the painters, whose art had become too much given up to themes which appealed to beauty of form rather than to the subjects drawn from Holy Writ. Those who accepted his preaching became known by their outward simplicity in dress and their grave demeanour; light-hearted gaiety was put aside as ignoble; and their nickname of *Piagnoni*, or weepers, a name bestowed upon them in contempt, sufficiently explains their attitude to life.

Botticelli's brother, Simone, became a devoted *Piagnone*, and was joined by Botticelli himself. Simone has left a commentary on Savonarola's preaching, from which it is easy to see how deeply Florence was moved in 1492. He speaks of the thousands who flocked to the church; the effect when the preacher began to speak. "When he mounted the pulpit steps, he was a new St. Paul;" and when in the cool summer evenings his most intimate followers walked with him in the quiet gardens behind San Marco's Church, "then indeed, for an hour or two, one seemed to be in Paradise, so great was the devotion and simplicity shown by all, and blessed were those who were present at these gatherings."

A new Jerusalem was to be set up on earth; good men were to come into their own. Then followed the night attack by Savonarola's enemies; his capture; his torture in the prison cell; and last scene of all, the execution which brought all the dreams of the *Piagnoni* to earth. Simone fled, but Botticelli remained in Florence, protected by his name and former attachment to the Medici, though Lorenzo had died shortly before, after sending for Savonarola to receive his last blessing.

The Frate's enemies spread scandalous reports of the great preacher now that he was dead. To Botticelli the world was beginning to close in in horror and deep dejection. In this state he painted a picture ("The Allegory of Calumny"), and sent it secretly to his dearest friend, Antonio Segni, probably also a *Piagnone*. It is now in the Uffizi Gallery, a terrible picture in its intensity of feeling against the wickedness which prompted men to speak such vile things of Savonarola. Even to-day, when we are so remote from the times which called forth such a theme, and even if we forget that the real subject was Savonarola's mock trial and shameful execution, this picture is felt to be dramatic in the highest degree.

In a spacious and beautiful hall, with fine arches and

pillars, against which statues and bas-reliefs representing old Greek myths as well as Bible stories are placed —St. George and the Dragon, Pallas with the Gorgon's head, Venus, Judith and Holofernes—sits the unjust judge on his throne, with Ignorance and Suspicion whispering in his ears to pervert his judgment. In the centre of the picture, Innocence, a youth, is dragged forward by a beautiful woman, Calumny, whose attendants, Fraud and Treachery, wreathe roses in her hair. Between this group and the judge stands a pale figure, Envy, lifting his hand to accuse Innocence.

On the left of the picture an old hag, muffled in her rags, and looking back over her shoulder at a tall and graceful figure, represents Remorse glancing furtively at Truth, who stands raising her hand to heaven, as though in a sure and certain hope that truth would at last prevail.

Botticelli's art had now run into a strange and sad groove. Vasari, to whose accounts of the Italian painters of his own days we are so much indebted, speaks contemptuously. "He became a partisan of the sect of Fra Girolamo, and for this cause abandoned painting. And since he had not got enough money to live upon, his affairs soon fell into the greatest disorder. Being obstinately attached to this party, he became what was known as a *Piagnone* (a 'sniveller'), and gave up painting, and was reduced to such poverty in his old age that he would have died of hunger if it had not been for the alms of men of substance who admired his genius."

This is only partly true. Botticelli did not cease painting, but he no longer drew his subjects from pagan sources, and a settled sadness appeared in all his works. Even when he paints the Madonna, he gives her a strange wistfulness and almost settled melancholy, as though she foresees the trouble and the wickedness which should possess the world, and particularly Florence—the city that Savonarola looked forward to as leading mankind back to a state of innocence and rectitude.

There is a remarkable painting by Botticelli in the National Gallery, London, curiously reflecting the artist's grief, and yet at the same time his belief in the ultimate victory of truth. It is a small work, and little likely to attract attention; but a closer inspection is well repaid by its intense interest as a record of the painter's mind.

This "Nativity" was most probably in the same class as his "Allegory of Calumny," a painting made for some brother *Piagnone*, and handed down from one generation to another among the cherished heirlooms of the family. We have already seen him in happier times introducing the family of the Medici as the Wise Men of the East worshipping the Child in Bethlehem—a glorification of his patrons rather than a simple statement according to former notions of a "sacred" picture. So this "Nativity" in the National Gallery resolves itself into a "Triumph of Savonarola," a prophetic statement that the Frate's teaching should come true.

In the centre are the Holy Family under a poor wooden pent-house, set up in a rocky cavern in a pine forest. An angel with an olive branch leads the shepherds to the stable; on the other side the Wise Men from the East kneel in adoration, while on the roof three angels bearing olive branches, the symbol of victory, sing the *Gloria in Excelsis;* and above them, in the blue sky, twelve seraphs, also with olive branches, fly hand-in-hand in an ecstasy of triumph.

In front, devils are seen hurrying to hide themselves in holes in the ground and among the rocks, while angels are seen embracing Savonarola and his martyred companions, all alike rejoicing that at length peace shall reign on the earth, and all evil flee away. And lest there should be any doubt whether the artist had any other meaning in his mind, these saints are robed in the Dominican habit—the order to which Savonarola belonged. Moreover, Botticelli has written on the upper part of the picture these words in Greek letters: "This picture, I, Alessandro,* painted at the end of the year 1500, during the troubles of Italy in the half-time after the time which was prophesied in the Eleventh of St. John and the Second Woe of the Apocalypse, when the devil was loosed upon the earth for three years and a half. Afterwards he shall be put in chains according to the Twelfth, and we shall see him trodden under foot as in this picture."

Thus the painter comforted his brother *Piagnone*, for whom this picture, so long hidden, was painted; recording his own belief that the Frate's words should come true in spite of the horror which had fallen on his followers after his death.

Ten years later, in 1510, this wonderful artist, the flower of his time, died, poor, old, infirm, having outlived that bright age which had opened so happily in Florence, when under Lorenzo dei Medici a new world, brilliant with promise, had drawn all men with its charm. Six years before his death he had been one of those selected to decide where to place Michael Angelo's colossal statue of David. He could hardly have foreseen that this young sculptor was to sway all Europe; that Fra Angelico and Botticelli himself were soon to be forgotten, or rather that in the light of this great genius their works were to be counted as poor and trivial things, almost beneath notice. The nineteenth century has restored both to their former state. Botticelli is seen to have been a great artist, richly endowed by nature, and in every sense one of the most poetical painters who have ever lived. And not only were his ideas grounded in native ability, but he had a power, possessed by few, of making his creations live —of showing, as it were, the soul shining in the face.

* His family name was Alessandro dei Filipepi, but among his contemporaries he was familiarly known as Sandro Botticelli.

Intending Competitors for the "Honours Page" should read carefully the rules on page 651.

DRAWING IN PUBLIC ELEMENTARY SCHOOLS, DENVER, COLORADO.

BY CHARLES M. CARTER, DIRECTOR.

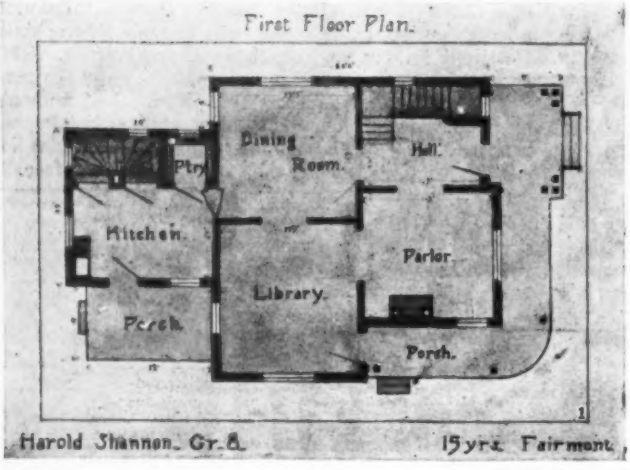
Eighth Year.

THE autumn work, as in other years, relates largely to the study of plant and vegetable forms employing drawing and painting (Plate I.). Colour schemes and decorative forms are derived from the natural forms for subsequent use in designing.

A decorative placard (similar to Fig. 4, Plate II.) for the door of the schoolroom constitutes one of the practical applications of design. It is supposed to be done on drawing or cover paper with low-toned colour, and embraces in three lines information like the following: "Eighth Grade—Miss Florence Gordan, Teacher." Around the lettering is placed an oblong, and outside this a border or other decoration from the September or similar material. Another interesting application consists of making a large decorated initial letter 5 inches high. In this exercise and many others the decorative forms are arranged to express "balance." This particular exercise is finished in black ink on white paper, as for photo-engraving, or illuminated with colour on white or tinted paper (Fig. 2, Plate III.).

Paper windows for the decoration of schoolrooms form one of the most important distinctive features of Denver art work. Examples were shown at the London Congress in 1908, and subsequently by special invitation in Paris. The most important of this work is generally done in the sixth, seventh, and eighth years. The first thing decided upon is the window space of the school building appropriate for this kind of decoration. Pupils are then asked to make small sketches of what they think would be appropriate. The ornamental forms are based on the natural ones studied earlier in the autumn, or upon similar forms from other sources. The most promising sketch is enlarged to full size with charcoal. When in this state, it is criticised, if possible, by the director of drawing. After correction it is transferred to "tag-board." The forms are cut out so as to form a stencil, the spaces of which are replaced by various coloured tissue paper. Throughout, this exercise occupies the attention of as many pupils as possible. This particular work is generally done outside of the regular drawing lesson. We find the results extremely valuable in cultivating invention, imagination, persistence, concentrated application, delicacy of manipulation, taste in colour, etc.

Pictorial drawing in outline reviews principles related to rectangular objects, and introduces others related to the cone and cylinder lying on a side, also to the square pyramid on its base and the triangular prism resting on an oblong face. Light and shade is expressed by the sepia pencil or charcoal (Figs. 2 and 3, Plate II.), the new mediums giving added interest. If time permits, drawings are reproduced on the blackboard, using white chalk and charcoal, or with coloured chalks on large sheets of gray paper attached to the blackboard. Subjects are selected having varied colour and texture. At times exercises are given in representing groups by colour, with colour values only (Figs. 1 and 5, Plate II.). Another interesting and profitable exercise consists of making a pictorial drawing of a house in outline or light and shade. The model is constructed in the schoolroom,



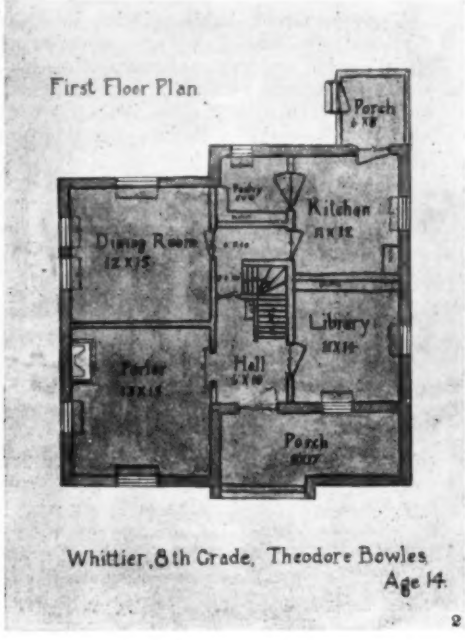


PLATE IV.

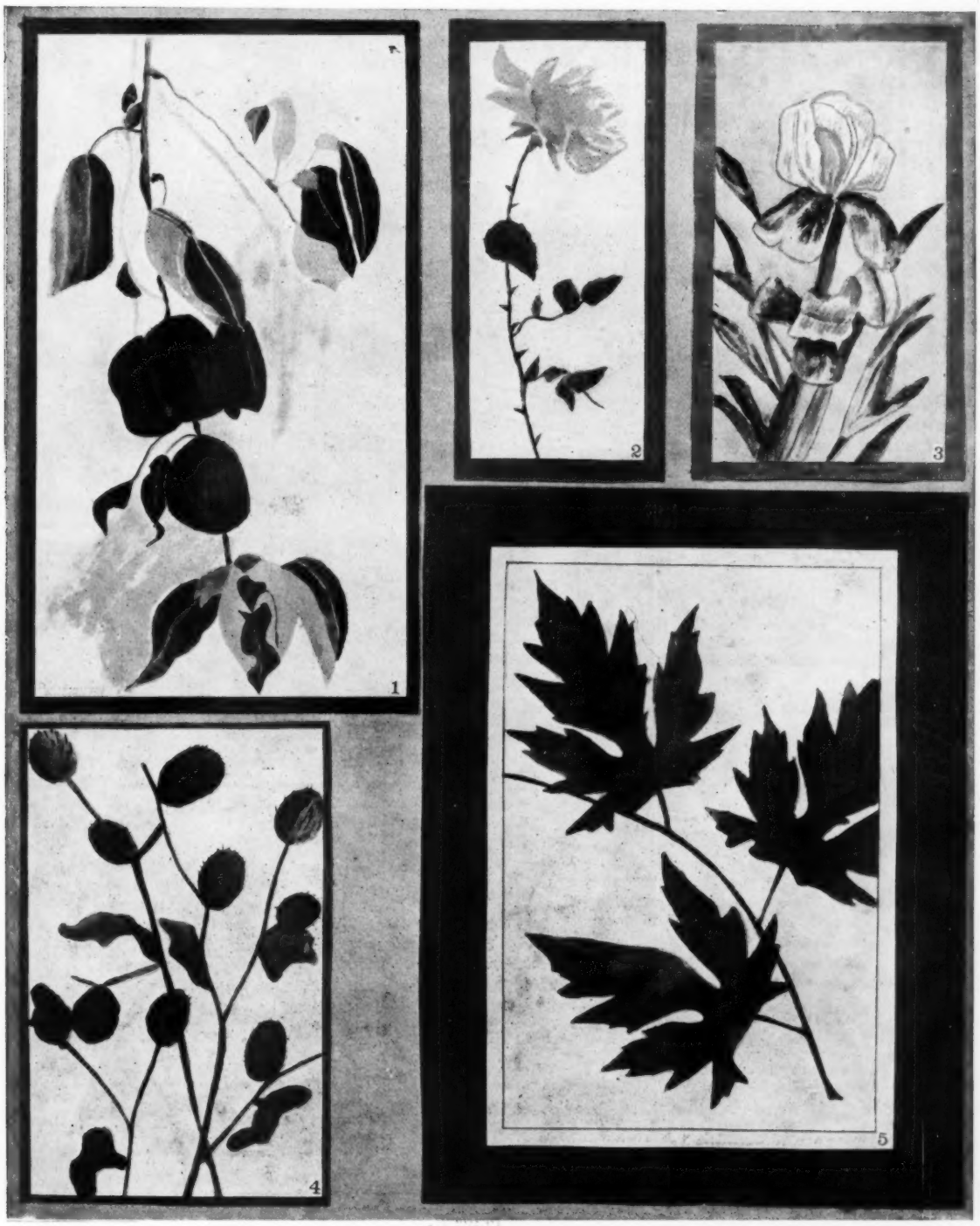


PLATE I.

PLATE II.

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There is so much bad
in the best of us,
and so much good in the
worst of us, that it
hardly behooves any
of us to talk about the
rest of us.
5
6

PLATE III.

of large boxes on which are marked doors and windows. This makes a good introduction to outdoor sketching.

The ideas introduced in the seventh year in making a floor plan of the schoolroom are extended in the eighth year by the introduction of an exercise in drawing to scale the floor plan of a simple house or the elevation of one side of a room. This exercise is considered to have particular value in enabling pupils in their future lives to express their ideas intelligently to a builder or architect (Figs. 1 and 2, Plate IV.).

Drawing from life is practised occasionally, and is optional.

The "special exercises" which are a feature of the earlier years are continued in the seventh and eighth years. Owing to the character of the work of these years, their number is limited to four, distributed thus, in the eighth year: *October* or *November*, an original design; *December*, floor plan of a small house; *February* or *March*, light-and-shade drawing of a group of coloured objects, introducing a rectangular object; *April* or *May*, a subject selected by the teacher to show the knowledge and ability of the pupils.

THE HISTORY LESSON AND DRAWING.

THE TUDOR PERIOD.

BY W. H. ELGAR.

PART I.

PROBABLY one of the greatest mistakes that has been made in the teaching of graphic expression is that drawing has been attempted before sketching.

Most of the former official syllabuses aimed at the perfect representation of easy forms and objects, generally in outline, and the work taken step by step from the blackboard often produced the so-called best results. This constant looking for finish and results, of course, led to the prevalence of copies and simplicity, and consequently to narrowness in range of the objects represented.

Then, in many cases, the leading idea seemed to be the preparation for the more serious study of art, and drawing was considered a specialist subject, and not the handmaid and exponent of other studies. Even now, it is well known that drawing does not do what it might in higher education.

Young children often hit the essentials of a sketch. They do not get the exact proportion and lighting, the one being the result of a trained eye, and the other more or less accidental; but they note the points which distinguish the object represented from all others.

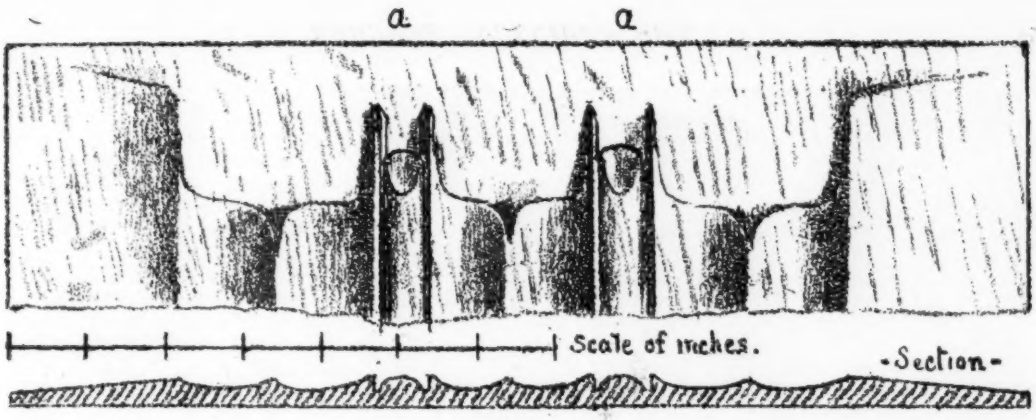
They give the object its individuality. Of course, we all know that they draw too much from preconceived notions, and not with sufficient study of the object—a reason for placing unfamiliar things before them.

If we are to allow any latitude in writing—of course preserving its legibility—in any part of a school, may we not permit some divergence from the mechanically straight line, true proportion, and even tint, in such note-taking as we are considering in these little papers. Granted that this is to be allowed, then to what extent, and what are we to look for?

In short, *every stroke* is to show that it is *the result of thought*—the record of an observation. Thought must always precede drawing. There must be no experiment—making a stroke, examining it, rubbing out, and modifying. All freshness and crispness, which are the characteristics of good sketching, are destroyed by this method. Coming to more detail, make a line a little shorter at first than necessary (a bit can always be added, not necessarily quite joined—a little space will not spoil the work); sketch lightly. If a line be not quite in the right place, make another near it a little darker. Do not rub out, for most likely the wrong line will form part of the subsequent shading. The first strokes made by artists are often of the nature of eye-steadiers or range-finding shots, and much can be learnt by the study of their sketches. Even if our only object in teaching drawing were preliminary art study, much could be said in favour of sketching, for great artists are almost invariably great sketchers. Ruskin says Turner made dozens of sketches for every one of his paintings.

In making the illustrations for these papers no children's work has been used up to the present, because it is desired to give a certain amount of reliability of representation, to create some interest in historical objects, and to make suggestions. Were the work of children invariably employed, many interesting points might be wanting.

It has been comparatively easy to select objects belonging to the previous periods studied, for to a great extent it has only been possible to take those within the powers and comprehension of children; but from the Tudor period onwards the material available increases immensely, and we are driven to exercise a double discretion. On the other hand, we are enabled to more truly illustrate the times under consideration. To some extent this can be done with our present study, treating indirectly the spread of learning and books by noticing the forms of letters before and after the period, and the growth of organised defence by Henry the Eighth's castle-building and ordnance construction; at the same time not neglecting the typical forms of common utensils and the distinguishing marks of historical ornament. Of these latter a few form our first plate of illustrations. Figs. 1 to 7 are the upper portions of the so-called linen-fold panels which, with their framing, lined the walls of so many Tudor mansions and decorated the church furniture of the time. The first (Fig. 1) is the top of a square panel in the possession of the writer. It is rather late in date; the two reeds (*a a*) and the absence of the overlapping effect show this, and the ornament seems to die into the sides, as does that of Figs. 5 and 6. A most simple one is Fig. 2, from the panelling of the pulpit at Newington Church, Kent. Fig. 3 is a little more complicated but similar one, from Layer Marney, Essex. Quite different, rounder and bolder, is Fig. 4; while the ridges in Fig. 5 are developed into the typical square leaf so often found in Tudor carvings. This leaf is seen very freely treated in Fig. 9. Both Figs. 4 and 5 were sketched from panels in Trull Church, Somerset. South Ken-



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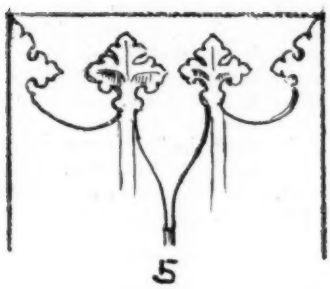

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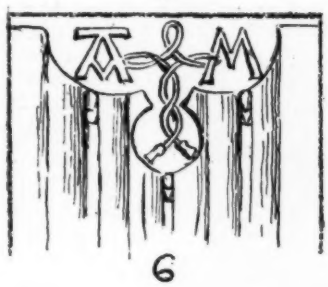

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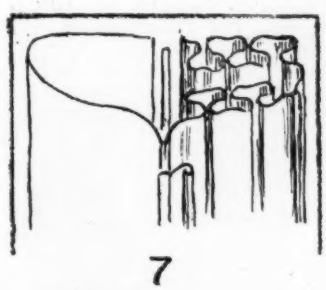

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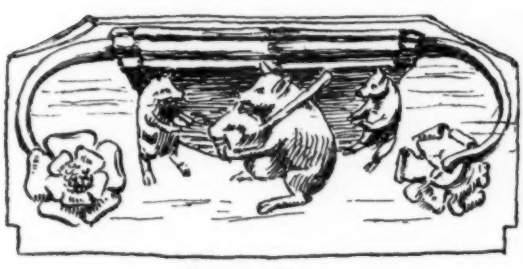

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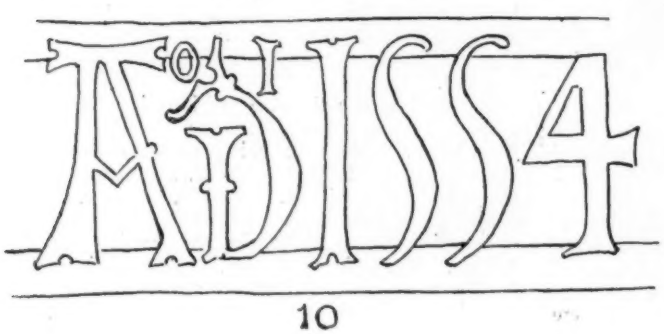

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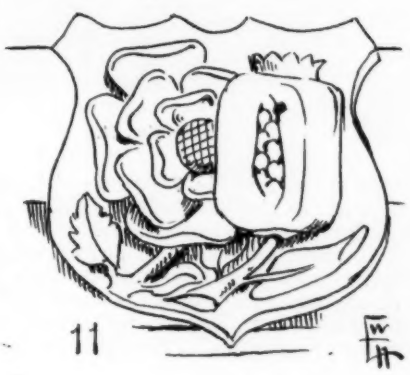


11

FIG. 12.

FIG. 13.

sington Museum possesses the other two examples, Figs. 6 and 7. The first of these shows an application of lettering, probably the initials of two names, to a late linen-fold panel (note the different finishing of the three reeds), and Fig. 7 gives the rich effect of a repetition of the simple principle. The left side is left in block to show the leading form.

THE WIFE OF ROBERT BRODMAN WHO HA
ISSVE BY THE SAID ROBERT SYX SONNES &
EYGHT DAVGHTERS & SHE DEPARTED THIS
WORLDE THE 23 DAYE OF IANVARY 1592.
BEINGE OF THE AGE OF XXXIX YEARES
LYVE WELL AND DYE NEVER
DYEE WELL AND LIVE EVER

FIG. 14.

It would be difficult to find better studies for advanced pupils than misereres—the little brackets found on the under sides of the seats of choir stalls, which brackets, when the seats were turned up, gave some support to the standing monks during the long miserere. Very many of them belong to the fifteenth century, and contain Tudor emblems. Our two examples (Figs. 8 and 9) from Carlisle show the rose, front and back views, and the before-mentioned square-looking leaf, as well as some frivolous pigs and a terrible-looking dragon. Most misereres show the two curved hornlike stalks springing from the central bracket, whatever period they belong to.

Young pupils could study the Tudor rose only, noticing its modifications when treated in stone, as on fonts, in coloured windows, and on brasses, and so on. Its two sets of five turned-up petals and compound eye

FIG. 15.

are infinitely varied. Fig. 11 shows a combination of the rose and the pomegranate on a shield from the monument to William Wilton in Salisbury Cathedral (the pomegranate was the cognisance of Queen Anne Boleyn).

Not so long ago the study of lettering enjoyed quite a boom in our primary schools; now it is almost a dead letter. Things like this (and there are many) set the experienced teacher thinking, and wondering what the next fashion will be. There is, however, an opportunity for a little reasonable and advantageous study of lettering in connection with the drawing and history lessons. Fig. 12 is a photograph of a rubbing of a brass to the memory of a priest. It shows well the form of lettering used before and during the early part of the

Tudor period, the pronounced vertical effect, close packing, and consequent difficulty in rapid reading; but the fine decorative effect to a great extent compensates for this. It is just as well to remark that the horizontal strokes over certain words indicate that those words are abbreviated. A little outline sketch (Fig. 13) shows, by the aid of letters, the various details of the priests' garments, as well as his shaven crown (A), called the *tonsure*. The highly decorated collar (B) is the decorated part of the *amice*, a small vestment which, secured round the neck, served the double purpose of a hood for the head and a collar for the neck. Covering almost the whole of the rest of the half figure is the *chasuble* (C), a robe which was originally of a square form having a hole in the centre for the head, and was worn during the celebration. The decorated (apparelled) sleeves of a white undergarment, the *alb*, plainly show at (D); while, depending from the left arm, part of the *maniple* (M) can be traced. This last was used for wiping the chalice.

Our next illustration, Fig. 14, serves the double purpose of showing the great change which came over lettering in the Tudor period owing to the adoption of Italian models, and of affording a reliable representation of a lady of the latter part of Elizabeth's reign. The quaint spelling, the various widths of the letters, the use of both Roman and Arabic numerals, and the saving of space by joining *h* and *e*, and *t* and *h* should be noted. Fig. 15 is copied very carefully (though it may not appear so) from a carved shield on a late fifteenth century font in an out-of-the-way country church, and is interesting as illustrating how an obscure mason translated manuscript forms of letters into stone. The letters read, "Jesiu Maria." They project about three-eighths of an inch, and the copy was obtained by pressing a thin, tough piece of paper over them.

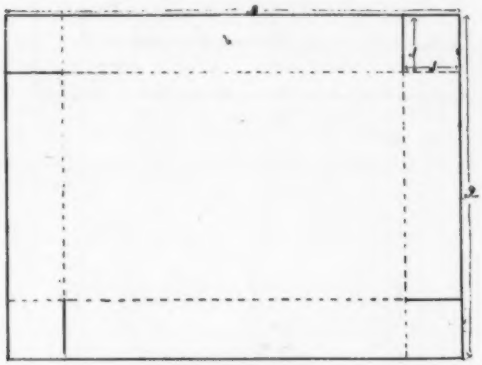
CONSTRUCTIVE WORK IN PAPER.

BY AGNES E. FARMAN.

BEDSTEAD.

Paper Needed.

Sheet I. A rectangle 8 × 6 in.
Sheet II. A square of 4 in.
Sheet III. A rectangle 4 × 3 in.



BEDSTEAD.—SHEET I.

Instructions for Working.

Sheet I.—At each corner mark out a square of 1 in. sides; join these by dotted lines, as in diagram, making firm the lines indicated. Cut on firm and fold on dotted lines, and paste up to form rectangular part of bed.

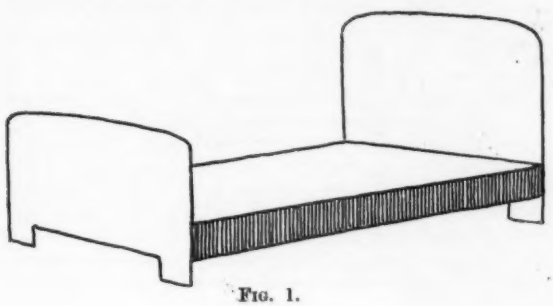
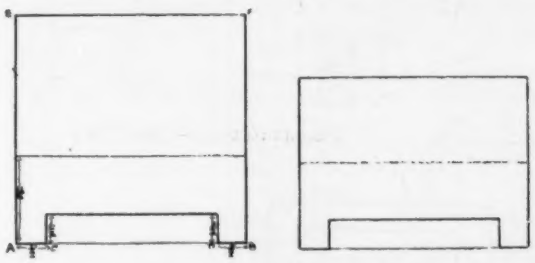


FIG. 1.

Sheet II.—At corners A and B on line AB mark off points C ½ in. from A, and D ½ in. from B. From C and D set up vertical lines ½ in. high. Join these as shown in diagram, and cut away the central space. The remaining pieces form the feet belonging to the bed-head. From corners A and B mark off 1½ in. on lines AE and BF. Join these points by a light line. This line fixes the position for pasting the bed on to the back.



BEDSTEAD.—SHEETS II. AND III.

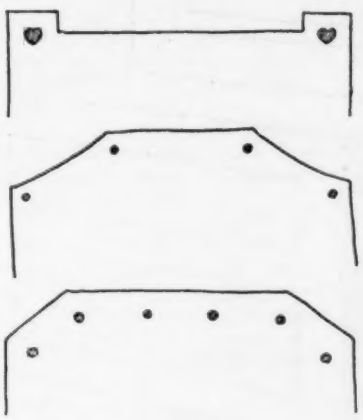
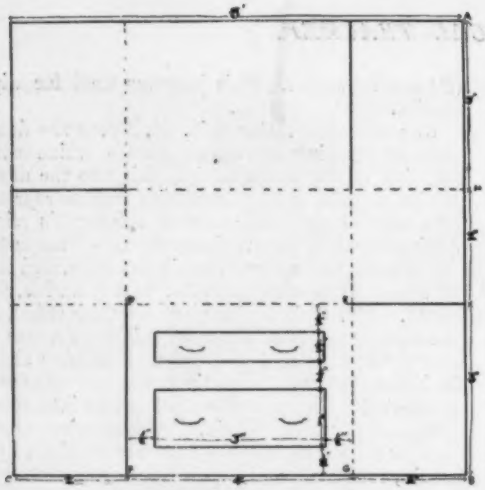
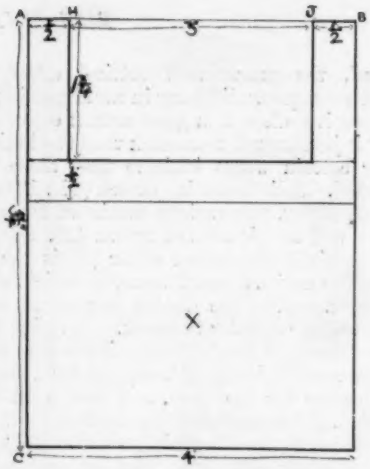


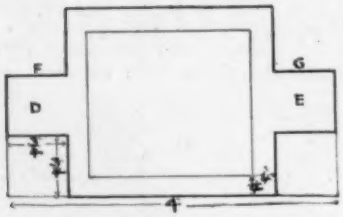
FIG. 2.



DRESSING-TABLE.—SHEET I.



DRESSING-TABLE.—SHEET II.



DRESSING-TABLE.—SHEET III.

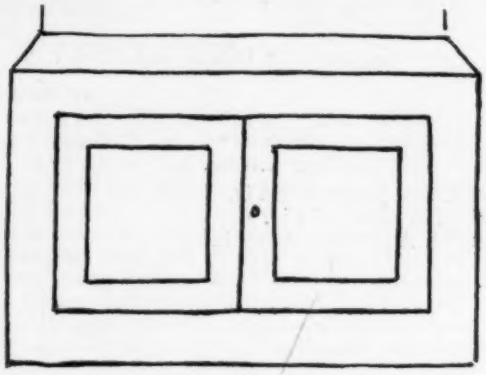


FIG. 3.

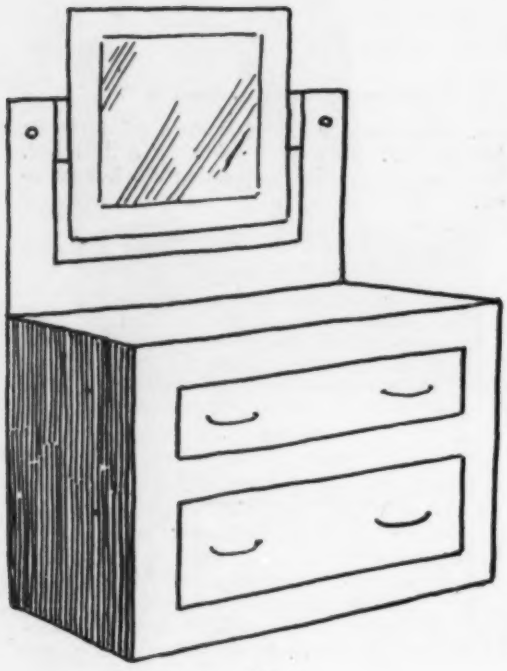
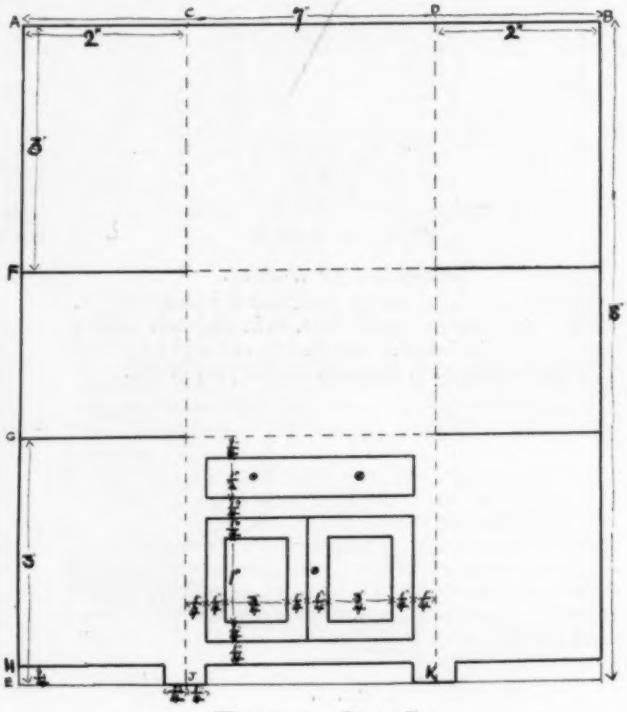
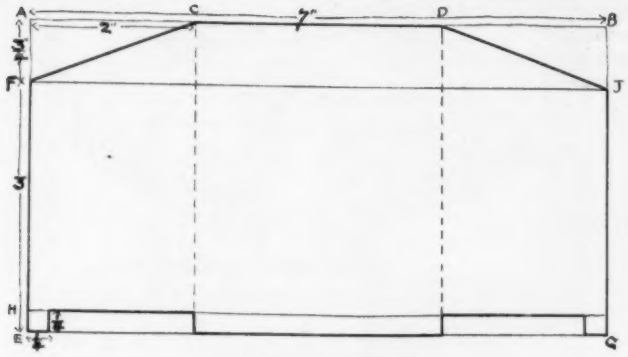


FIG. 4



WASHSTAND.—SHEET I.



WASHSTAND.—SHEET II.

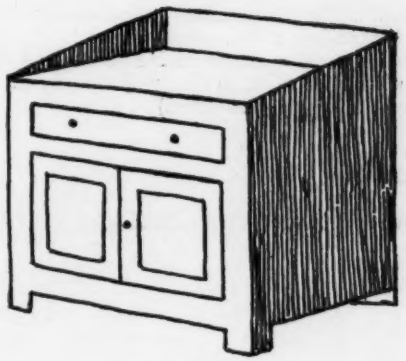


FIG. 5.

Sheet III.—Proceed as in Sheet II. for foot of bedstead. The foot and head should now be pasted to the flat part of the bedstead. The tops of these are left square in the diagrams, but they may be rounded as in the sketch (Fig. 1), or treated in various ways, as in Fig. 2.

DRESSING-TABLE.

Paper Needed.

Sheet I. A square of 8 in.

Sheet II. A rectangle of $5\frac{1}{4} \times 4$ in.

Sheet III. A rectangle of $4 \times 2\frac{1}{4}$ in. A piece of white tissue paper $1\frac{3}{4} \times 2$ in.

Instructions for Working.

Divide *Sheet I.* as follows: From A on line AB mark off H 3 in. from A, and J 2 in. from H. Mark off on line BC point G 2 in. from B, and F 4 in. from G. From points H and J rule lines across square parallel to BC. From GF rule lines parallel to AB. These are to be ruled firmly or dotted, according to diagram. Cut on firm lines, fold on dotted.

Before folding up, rule firmly on front face of table DEFG two drawers, and draw freehand the handles. Dimensions are given on diagram, but these may be varied, or cupboard doors may be substituted (Fig. 3). Paste together to form rectangular block for table, and allow to dry thoroughly before the back (Sheet II.) is fixed on.

Sheet II.—From A and B along line AB mark off $\frac{1}{2}$ in. H and J, leaving a central space of 3 in. From point A on line AC mark off $1\frac{3}{4}$ in., and draw light line parallel to AB. From H and J draw lines parallel to AC to meet this light line. This forms the rectangle into which the looking-glass is inserted, and should be cut out as in diagram. Another light line $\frac{1}{2}$ in. below the first may be drawn to mark the place where the table is pasted on to the back.

Sheet III.—At each corner mark out a square of $\frac{3}{4}$ in., and cut these away. In the central rectangle draw another rectangle $\frac{1}{2}$ in. smaller each way, to fix position for the piece of tissue paper which represents the glass, and which should now be pasted on.

(*To be continued.*)

NEEDLECRAFT FOR PRIMARY AND SECONDARY SCHOOLS.

BY ANN MACBETH AND MARGARET SWANSON, INSTRUCTRESSES AT THE GLASGOW SCHOOL OF ART.

PART II.—(*Continued.*)

WE continue suitable grading for the child between ten and eleven years of age, and take as our next exercise a kettle-holder, which illustrates *flannel binding, stitching, tape loops,* and *single darning, as for twilled surfaces.*

The binding may be placed equally on both sides, but it is stronger to have one-third of the binding on one side, with two-thirds turned down on the other side of the material requiring to be bound. The right side is generally hemmed or stitched, as we have it in Diagram 9, and a row of fine tacking or running keeps the braid easily in place on the wrong side.

The pleat of the corner binding should be hemmed down neatly, and precision in having the corner pleats balanced should be observed. Sewing on the corner tape and running a twilled darn finishes an economical and popular exercise. As *twilled darning* comes in very usefully during the supplementary stage, it can be practised in decorative fashion at this stage with much success. Charming arrangements of colour may be had, say green twilled flannel bound with purple braid, sewed and darned with orange embroidery thread (Clark and Co., Paisley). Here again mending yarns may be employed instead of embroidery thread. No. 5 Scientific Needles (Kirby, Beard, and Co., Redditch) are still used.

Diagrams 10, 11, 12, 13 bring us by graded exercises to the button-hole proper, which is sewed after the focussing of the eye, between eleven and twelve years, during the qualifying stage.

The type illustrated in Diagram 10 introduces incidentally a fresh fabric—linen—with the *need* of a stitch adapted to suit its qualities. But print and calico, as well as the rougher serges and flannels more liable to fraying, *need* a like preventive; and *button-hole stitch* is the preventive.

Sewn widely apart, yet strong enough to prevent the ravelling of raw edges, the stitch is known as blanket stitch (Diagram 10). Sewed quite closely together, as in Diagram 11, the stitch is known as embroidery stitch.

Really, whether popularly called this or that, the stitch is button-hole stitch. (Some beautiful Danish lace work, sewed at odd minutes during the day by the labouring class of Denmark, is executed entirely in these gradations of button-hole stitch.)

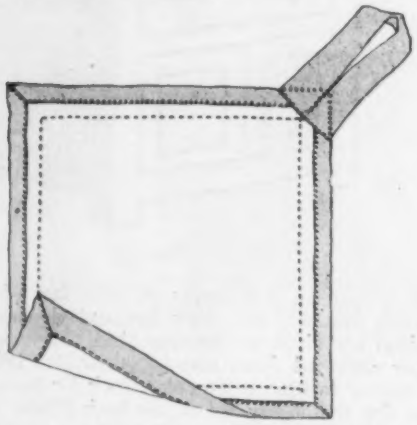


DIAGRAM 9.—A kettle-holder, showing flannel binding and a tape loop.

In experimental work a child of eleven years has brought delightfully modelled baby's shoes in serge, with the raw edges all closely button-hole stitched, the stitches rather less than a quarter of an inch deep.

Diagrams 12 and 13 are easily-constructed types of

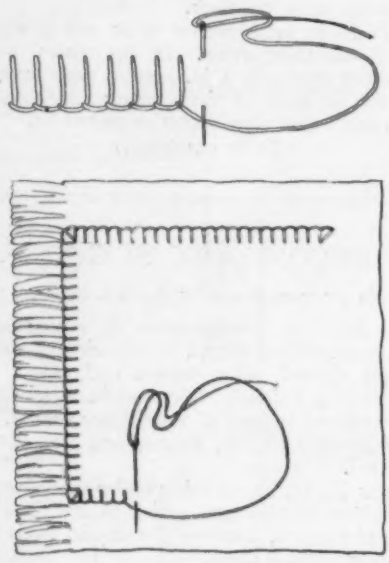
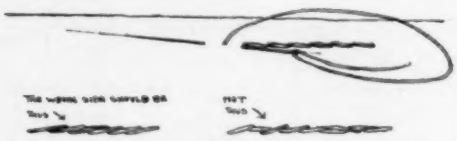


DIAGRAM 10.—A mat, showing simple button-hole stitch, sometimes called blanket stitch.

turn-over collars, button-holed closely together to prevent ravelling, to give strength, and thereby also giving a decorative finish. At certain intervals, eyelet holes may be pierced to expand the decorative effect somewhat.

The colour scheme may be different for each girl, and her own choice of colour will give added interest



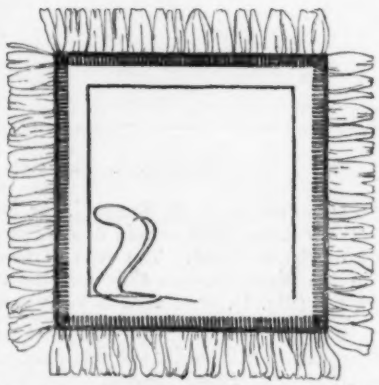
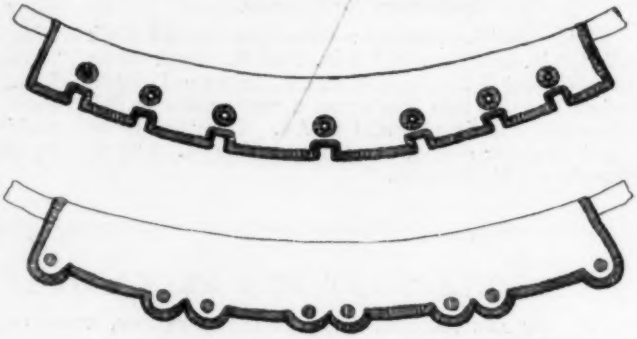


DIAGRAM 11.—Another mat, showing double-twisted button-hole stitch and stitching.

and stimulus. Quoting from Circular 730: "The interest of a child is excited and maintained if she feels that she herself is responsible for the construction



DIAGRAMS 12 and 13.—Two collars, introducing scalloped button-hole stitch and eyelet holes.

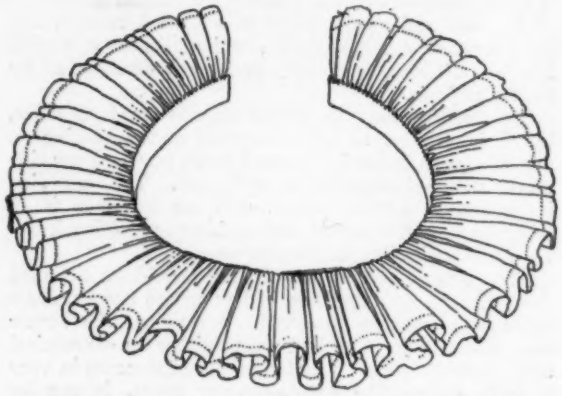
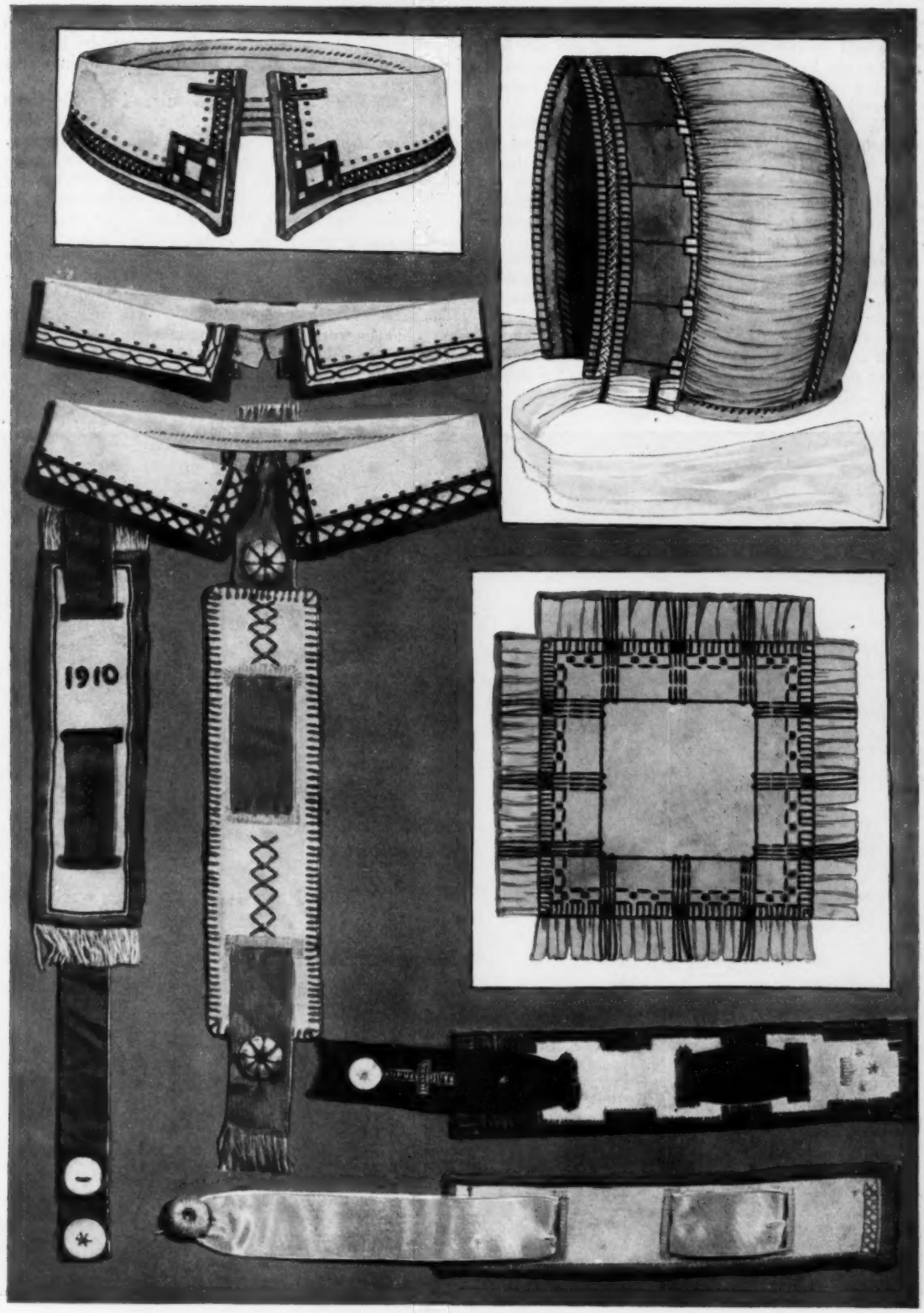


DIAGRAM 14.—Illustrating gathering, stroking, and setting into a band.



EXAMPLES OF NEEDLECRAFT.

of something, even if it is only a doll's petticoat. Her interest will be still further stimulated if she can feel that what she has done is of real use, and that in doing it she has done something, however small, for herself or others."

As the child from six to eleven years inclusive has to pass through an "art period," so the years eleven to twelve (qualifying stage) will lead us to the "artisan period," and for the first time we introduce, at eleven years of age, white thread on white material; in short, the child begins to sew short, easily-constructed exercises in the *same tone of colour*.

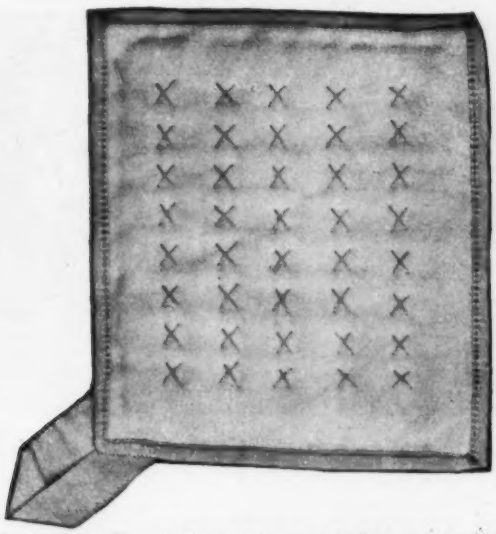
Diagram 14 illustrates *gathering*, *stroking*, and *setting-in* applied as a tucker. White calico or long cloth may be used with No. 40 white cotton, and No. 6 between Scientific Needles.

It is precisely at this period, with her growing knowledge of technique, that *the girl must be warned against straining the eye*. For while the majority of children attain normal vision now, a certain number develop slight myopia by overwork at close range—by lacking, in fact, a view for the eye to roam over and in which to rest.

We are glad to give several coloured reproductions of experimental work at this stage, showing the effect of coloured cotton threads on inexpensive materials. The stitches are in every case confined to one or more of the exercises already learnt, and the *constructive* lines of each article are made into decoration, with some other purely supplementary stitching on simple lines to add to the decorative effect. This, in contrast with the ordinary school sewing exercises, shows the growth of the artistic idea along with the purely utilitarian purpose of the work, as opposed to the old tendency to make all stitching as far as possible resemble the work of the sewing-machine—the growth of the *creative* faculties as opposed to the purely imitative

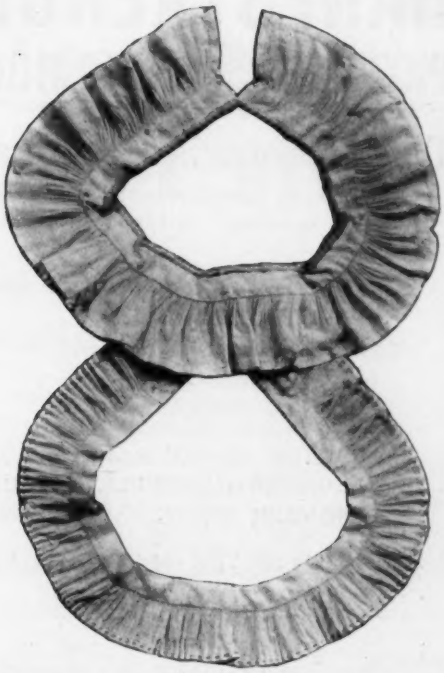
FLANNEL BINDING EXERCISE.—White baby's shawl and hood combined, bound with pink flannel. Embroidered in rose and blue.

No. 1. White flannel edged with orange braid, and darned with "twill" darning in orange.



No. 2. White flannel edged with green binding, and stitched with blue.

No. 3. Gray flannel bound with rose-coloured braid, and darned in rose-coloured wool.



No. 1. Tucker in white, the edge of the band button-holed with green.

No. 2. Tucker in white, with a "goffering thread" run into the edge of the frill. This is drawn tight when the tucker is ironed, and keeps the frilling even till it is pulled out again for use.

No. 3. Yoke in gray linen, sewed with black, blue, and white.

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THE response to the offer contained in our Supplement of last month is exceedingly gratifying, and proves conclusively that regular readers of "The Practical Teacher" are among the most progressive and far-seeing members of the profession. We are informed on good authority that *the Board of Education will shortly deal in a very practical manner with the curriculum question now before the country by making definite changes in the Code and Suggestions to Teachers.* When these changes are actually made, our own readers at least will be prepared for what will be required of them.

The Warm Support of the N.U.T.

At the Plymouth Conference of the National Union of Teachers our offer of Technical Scholarships attracted widespread attention, and many of the delegates gave expression to unqualified approval of the scheme. Miss Isabella Cleghorn, the newly elected Vice-President, whose portrait we give elsewhere, and to whom we have already offered our congratulations in the name of our readers, writes to us:—

"May I ask to be allowed to congratulate you on your foresight in so ably preparing **for what is certain to come in the near future**—more practical work in our day and evening schools.

"The educational gap 'twixt school and citizenship' must be bridged, and any effort to prepare for coming alterations with that end in view must be for good.

"To those teachers who have not the opportunity of attending technical institutions or trade schools, your offer of technical scholarships in connection with the I.C.S. must be of great value, not only as incentives to more practical study, but as tending to improve industrial training and mitigate some of the evils of unemployment.

"I am sorry that pressure of work just now forbids my entering more fully into the subject, but I conclude as I began, by congratulating you on making your valuable paper practical in reality as well as in name."

Mr. A. R. Pickles, M.A., the well-known educationist and ex-President of the Union, is already helping our readers to make the daily work more interesting and helpful by his articles, written in conjunction with Mr. Dalton Grange, which are at present appearing in "The Practical Teacher." Our readers will be interested in his opinion of our Technical Scholarship scheme. He writes :—

> "These are days of steady and continuous advance in commerce, science, and technology; and the teacher who ceases to make himself further proficient in one or more special subjects **will soon see himself slipping rapidly into the professional backwater.** This handsome proposal, connected as it is with the International Correspondence Schools, is a real, a substantial, a most tempting offer to the go-aheads, who will see in it an opportunity for acquiring experience, and for anticipating those imminent changes which will revolutionise educational ideals in the very near future."

We like Mr. Pickles's term "the go-aheads," and are glad to find that the teaching profession numbers so many members of this precise character, as is proved by the response to our present offer.

COUNCILLOR JOHNSTONE WALLACE.

The Opinion of a Prominent Public Man.

It is not only from prominent educationists, however, that our scheme has received approval. One of the best-known public men in the North of England, Councillor Johnstone Wallace, *Deputy Lord Mayor of Newcastle-on-Tyne, and Vice-Chairman of the Education Committee for that progressive city*, writes as follows :—

> "There is no doubt that certificated teachers would gain many advantages by obtaining Technical Scholarships. **There is need for persons possessing the teaching gift who can take technical subjects in evening schools and elsewhere.** Your enterprise in meeting this need, by offering scholarships to the teachers, is most commendable and worthy of support."

OUR OFFER STILL OPEN.

We have been asked to name the latest date for taking advantage of "The Practical Teacher" Technical Scholarships, and on this matter beg to make the following announcement :—

The offer made by the Proprietors, in conjunction with the

International Correspondence Schools,

is still open; and will be kept open long enough to enable our readers in various parts of the Empire to fall into line with the most progressive teachers at home.

The movement in which we are endeavouring to take our part is not a mere local or insular movement. It concerns all the English-speaking races, and will eventually revolutionise primary education throughout the Empire.

At the same time, we strongly advise all teachers in these islands **to close with our offer at once.** There is no time to be lost, and to vary slightly the old Latin tag, "He takes twice who takes quickly." Send at once for a copy of our April number, the Supplement to which contains full terms of our Free Technical Scholarships, and a detachable inquiry form.

Our Offer and the Newsagent.

Some of our readers have raised a question, the answer to which may concern many of those who have been accustomed to obtain "The Practical Teacher" from the local newsagent, and, possibly, many who are hesitating to respond to our offer. This method of obtaining the paper may still be followed by those desiring to take up one of our Technical Scholarships; but the subscription for a year, whatever sum the newsagent may charge, must be paid in advance. The newsagent's receipt must then be sent to us in order that the subscriber may be entered in our books as eligible for a scholarship. The receipt will be at once returned to the holder. This course has already been followed in several cases. We hope this matter is now quite clear. The proprietors of "The Practical Teacher" have no intention of entering into competition with the trade; on the contrary, their earnest desire is to obtain fresh customers for the newsagents throughout the land.

A Few Points of Detail.

Teachers are asked to note that applications for further particulars of our scheme **must be made on the detachable inquiry form contained in the Supplement to our April issue.** No other application can be entertained. Our Scholarship scheme is a costly matter, and is planned to be of service only to our regular subscribers. Further, the subscription to **"The Practical Teacher" must date from the time of applying for a Scholarship, and extend for twelve months.** We ask for nothing but support in extending our circulation, and feel confident that all fair-minded readers of "The Practical Teacher" will see that we get it.

Our First Scholarship Holder.

The first form of application for a Free Scholarship was received on the morning of April 11. It came from a teacher whose age is fifty-two according to the calendar, but whose letter shows him to be one of the youngest of the profession in matters of pluck and perseverance. All honour to him!

The International Correspondence Schools.

Applicants for our Technical Scholarships have evinced great interest in the remarkable work now being done by the I.C.S., and they will probably be further interested in the following expression of opinion on the part of a well-known man.

Dr. Henry Dyer, *Vice-Chairman of the School Board for Glasgow*, speaking at a meeting of I.C.S. students, recently said:—

> "I have been connected directly with education now for a very long time; and while I recognise the good work that is being done by what we call the official educational organisations, I feel that in many cases they suffer from certain disadvantages.
>
> "One of them, I think, is the uniformity of the curriculum, which is often drawn up for students, and which does not appeal to many of them, because it has no practical bearing upon their daily work. There should be greater freedom in the selection of the subjects, and greater freedom in carrying out any special studies which are required in connection with their work.
>
> "I think your schools give that freedom, and allow a student to take up any subject which he requires in his ordinary work. And it has this further advantage. When visiting the evening classes of the Technical College, I am somewhat sorry for some of the students. After working all day, it is a very great strain on them, both physically and mentally, to come to those classes three and sometimes four evenings a week for two or three hours each evening. Those who survive it are the better for it; but it is a great strain, and I should like to see greater elasticity in this connection. Your organisation places it within the reach of students to consult their own convenience and their own strength in carrying out their educational work.
>
> "I wish you prosperity in your work; and if I can be of any service in helping that work, it will give me great pleasure to do all in my power."

Correspondence Tuition v. Personal Teaching.

We have already advised our readers to get into personal touch, when possible, with the teaching agencies of their own district. But the Technical Classes, where they exist, do not always suit the teacher's convenience; and it is because we know from personal knowledge the difficulties which encompass the teacher in his attempts to improve his status, that we have allied ourselves with the International Correspondence Schools in our offer of Free Technical Scholarships.

Lose No Time—Act To-day.

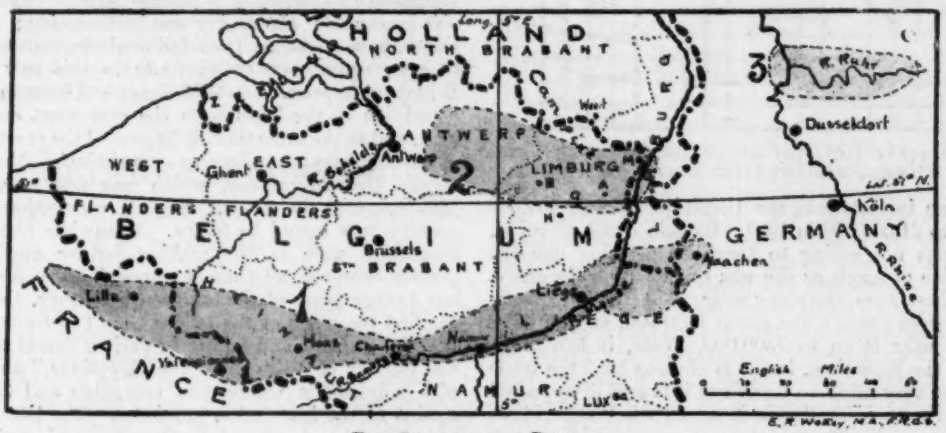
To those of our regular readers, and to others who may chance to read these lines, we offer a final word of advice. Send for, or order from the nearest newsagent, a copy of "The Practical Teacher" for April. Fill up the preliminary inquiry form, to be found on page 8 of the Supplement to that issue, and send it to us at once. This will put the matter in train.

GEOGRAPHY NOTES UP-TO-DATE.

BY E. R. WETHEY, M.A., F.R.G.S.

The New Belgian Coalfield.

WHAT has for several years been a matter of speculation in Belgium is now apparently a certainty. A recent communication in the *Times* gives good ground for adding a new coalfield to Belgium's already fairly ample supply, and that, too, in a district which is at present isolated from the existing centres of industrial activity. It is nine years ago now since Professor Dumont of Louvain "struck" coal at Asch, in the eastern part of the Belgian province of Limburg. Continued investigations have at last ascertained the position of the coalfield, of which this initial find was but a fragmentary corner. It may be considered an extension of the great German field in Westphalia, and its western end reaches nearly as far as Antwerp. It is thus about 50 miles long, and, according to some authorities, from 10 to 20 miles broad, bearing seams which vary from 1 to 10 feet in thickness. Its position is shown on the accompanying map, though its width is probably exaggerated. It runs under the south part of the Campine—the driest, sandiest, and most desolate part of Belgium. It is therefore well to the north of the famous Sambre-Meuse Coalfield.



THE COALFIELDS OF BELGIUM.

1. The old field.
2. The new (Campine) field.
3. The German (Ruhr) field.

Localities in Belgian Limburg:—
A. Asch. G. Genck. M. Maeseyck.
B. Beeringen. H. Hasselt.

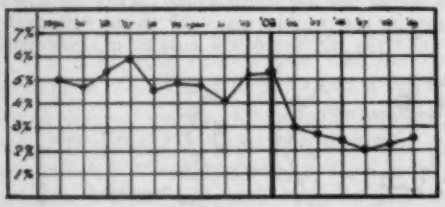
No time is being lost in developing the new field. Experts consider that in four or five years its output will have to be reckoned with. A pit is being sunk at Beeringen, and further experimental borings are being made at Genck. At this latter place, as many as eighteen seams of coal are said to exist, between depths of 1,700 and 3,000 feet, though none are of a greater thickness than 3 or 4 feet. Railway extension will follow. There is a direct line from Antwerp to Hasselt, which leaves Limburg at Maeseyck, and another farther north, from Antwerp to Weert (Dutch Brabant), both converging, so to say, on Dusseldorf. A light railway has already been constructed between Maeseyck and Weert, and the next developments in this way will be to connect the various collieries with one or both of the Antwerp lines. With the usual Belgian promptness in matters industrial, province Limburg has signified its intention of voting a million francs, or more if necessary, for the improvement of means of transport.

The importance of the new field is self-evident. With one exception, Limburg is the most thinly populated province in Belgium. The average density for the whole of the country is well over 500 to the square mile. Limburg's density works out at about 250. Its neighbours — Brabant, Antwerp, and Liège — are each over 700. Brabant, indeed, nearly touches 1,000. This sparseness is all owing to the Campine, which, notwithstanding that much of it has been reclaimed and turned into prosperous butter farms, still bears evidence of its former heaths and marshes. If a great mining industry should spring up, there is no reason why the prosperity of South Belgium should not repeat itself in the north. The machinery of Seraing, the firearms of Liège, the woollens of Verviers, the steel of Charleroi, the cutlery and glass of numberless towns on the great Hainaut Coalfield, might find awkward rivals nearer the great international port, and certainly the mines of Mons would feel the competition. They are among the deepest in the world—many of them well over 3,000 feet—and the winning of the coal is, in consequence, an expensive operation; and yet nearly 70 per cent. of Belgium's coal output comes from this quarter alone. It is this question of *deep* workings which handicaps the Belgian coal industry of to-day. Nor is it to be wondered at, when one remembers that the first coal-mine in Belgium was opened as long ago as 1138—long before our Newcastle appeared upon the scene. The appearance, therefore, of new and shallower workings in an old coal country has a special significance. It remains to be seen whether the performance will come up to the promise.

Effect of a Little Fiscal War.

Teachers and students of commercial geography should note the cause, progress, and consequence of a short fiscal war, to which *The Times* has recently drawn attention. It has been evident for some five or six years that Germany has not been holding its own in the trade of Canada; and nowadays, when Germany cannot hold its own in matters commercial, the cause is worth seeking. The figures are plain. For the ten years up to and including 1903 German imports into

Canada averaged about 5 per cent. of the total imports. Since 1903 this average has been but 2½ per cent. The whole cause was a little fiscal disagreement which is as interesting as it is instructive. In the year 1898 Canada passed its "Preferential tariff" on behalf of the United Kingdom. As this was no less than a 33⅓ per cent. preference for British over all other countries' goods, it was naturally not well received by so assiduous a rival of ours in the world's markets as is Germany. She showed her indignation unmistakably in 1901, when, on the occasion of striking a new commercial treaty with Great Britain, she put the whole British Empire, *except Canada*, on what is known as the "Most-favoured-Nation" tariff. Canada she ostracised by placing her upon a higher tariff altogether. Then the fat was in the fire. Negotiations were attempted, but nothing came of them. Accordingly, in 1903 Canada struck back, and imposed a drastic 33⅓ per cent. surtax on all German imports, with the immediate result as shown in the annexed diagram, and a total drop in the value



PERCENTAGES TO TOTAL IMPORTS OF GERMAN IMPORTS INTO CANADA, MARKING DECLINE SINCE 1903.

of German imports into the Dominion from £2,500,000 in 1903 to £1,500,000 in 1909. Canada could afford it, as she was not selling to Germany anything like the same value of goods as she was buying from Germany. The highest sum Germany ever paid for one year's imports from Canada was about £500,000, and in 1909 this had only fallen to £300,000. True, it had fallen lower in the meantime, but it is obvious that the trade was never very much to lose, even if it had disappeared altogether. Incidentally, it is an ill wind that blows no one any good. The two German commodities hardest hit by the famous surtax were sugar and Portland cement. The former trade was transferred bodily to the West Indies and British Guiana—a rare victory for cane over beet; and the latter benefited, first British cement makers, but afterwards the manufacturers of Canada itself. Altogether the whole affair is a neat little example of a "fiscal war." It will be interesting to note how long Germany will take to recover its former position now that it once more enters the lists, for by agreement the "war" closed, and "peace" was proclaimed on March 1, 1910.

GEOGRAPHY AND HISTORY IN MODERN N.E. AFRICA.

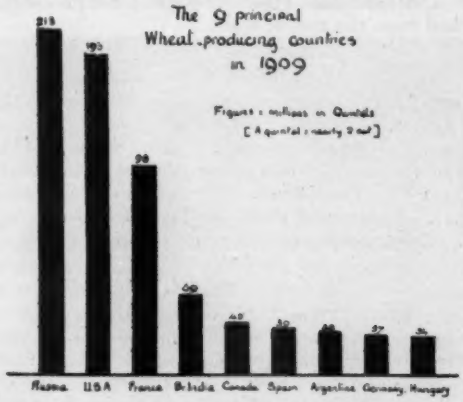
It is a truism to say that no one man, however brilliant, is necessary to the age in which he lives. *Uno avulso non deficit alter*—the world never lacks individuals when the opportunities arrive. And yet there is always a fascination in attempting to ascribe the great events of history to the prowess of a single man—the Reformation to Martin Luther, the Commonwealth to Oliver Cromwell, the Restoration to General Monk. In a paper read to the Royal Geographical Society by Sir William Garstin on fifty years of the Nile and its explorers, the individual selected as the prime originator of events which have ultimately coloured red nearly all that north-eastern corner of Africa, from the coast of British East Africa to the mouth of the Nile, is none other than Captain John Hanning Speke. And certainly the chain of events is well linked up. In 1858 Speke discovered the Victoria Nyanza, and had his life-quarrel with Burton over it. The latter maintained that Tanganyika, and not the Victoria, supplied the head-waters of the Nile. Speke persisted in what was afterwards proved to be the correct theory. The interest of England was for the first time directed towards Equatorial Africa. In 1863 Samuel Baker met Speke at Gondokoro (the south boundary line of what is now the Anglo-Egyptian Sudan), and was so fired with enthusiasm at Speke's work, and especially at the explorer's notion that there was probably another great lake to be discovered, that he determined to investigate the matter for himself. This he did, and discovered Lake Albert. Once more British public opinion was aroused, and Stanley's second expedition (1874) was the result. It was then that Stanley, after circumnavigating the lake, and arriving at the capital of Uganda, appealed for missionaries as a first step to introduce European civilisation into Central Africa. This appeal was successful; the money was forthcoming; the missionaries were sent. Then followed the natural desire to open up a more direct route to this new field of British enterprise. In 1883 Joseph Thomson led an expedition to the lakes from the east coast *via* Masai-land, and at the same time, as he proved the practicability of the Mombasa route, became—unwittingly—the pioneer of the Uganda railway, which was first surveyed in 1892 (opened in 1901). English occupation of the country was bound to follow. Meanwhile history and geography were in the making farther north. Two periods comprise all that is material. The first is the last twenty years of the nineteenth century, the second the first ten years of the twentieth. The former period saw the attempt and failure in various forms to render real the cry of "Egypt for the Egyptians," and closed with Kitchener's Omdurman campaign and the reclamation of the lost Sudan provinces. The latter period has seen the wonderful engineering and agricultural works which have had for their object the improvement of navigation and irrigation along the whole length of the Nile up to Gondokoro. And so we arrive at the ultimate result—the solid red tint of British supremacy on the map from Alexandria to Mombasa. And the man who of all men may be said to have set the ball rolling, the man whose name comes first and foremost, whatever other names we inscribe on the roll of honour—Captain John Speke—what reward had he? Permission was granted to him that he might add supporters to his coat-of-arms in the shape of a hippopotamus and a crocodile! That was all, for governments are chary of recognising solitary genius, even when the ultimate profit accrues to themselves.

WHEAT IN 1909.

The wheat figures of 1909 are just out. There are few countries in the world which do not grow wheat, but the position of the leaders in a world-table is remarkable. Russia and the United States are far ahead of all other countries; France makes a poor third, but has no rival immediately below it; while India in the fourth place is also easily clear of the succeeding countries.

France really holds the most unique position. It has neither the cheapness of land nor the cheapness of

labour which accounts respectively for the great outputs of the United States and India. Nor has it any extensive regions of fertile soil which will compare with the famous chernoziom, or Black Earth zone of Russia.



As a matter of fact, it is only quite within recent years that the latter country has shot ahead.

Incidentally, the tables show that there is much leeway still to be made up by those two granaries of the future, Canada and the Argentine.

AGRICULTURAL EDUCATION.

A SCHEME OF WORK FOR RURAL SCHOOLS.

BY W. FRANCIS RANKINE.

Rural Arithmetic.

FOR several reasons the rural teacher discovers a great difficulty in arithmetic. The more remote his district from the town and the smaller his school, the greater this obstacle becomes. It is, I believe, a problem which has never received a satisfactory solution from the teacher, or the inspectorate either; and undoubtedly the matter will remain much as it is until the rural school and its system in general have been thoroughly reorganised. An analysis of the arithmetical trouble reveals the following facts. First of all, the countryman is not remarkable for mathematical curiosity. His forebears were not, and he, in his daily routine of farm and field, is not subjected to any stimulus which is necessary to the maintenance of mental activity. Beyond the occasional calculation demanded by piecework, and the periodic valuation of a pig, there is little necessity for him to enter the domains of arithmetical reckoning. In the old times the tally-stick—a mystic reckoner in scores and dozens—reduced ready reckoning to a fairly easy matter, and that to-day the farm labourer is not wholly independent of tallying aids is evident in the rows of mystic chalk marks which frequently adorn barn doors. Thus the country child does not commence school life with any appreciable hereditary capital in the business of figures. And in the home and converse with the outer world in general there is little immediate experience to arouse that liveliness of mind which is so essential to success in this vital subject.

There is, however, another reason, and this is a fundamental one, which explains the impossibility of arithmetic in the country school. It is the staffing difficulty from which very few rural schools are free. In this direction the inadequate teaching power of the country school is the greatest obstacle of all, and in the majority of cases is traceable to staffing schemes evolved by expert theorists who have little knowledge of the difficulties of classification as required by the small school. To appreciate this fact fully, imagine a teacher grappling with an arithmetic lesson as required by three standards grouped in one division. Then realise that the inspectorate demands preludes of mental exercises to each lesson, and the narrow limits of the teacher's power are at once obvious. Truly the children are few, yet this does not compensate for the heterogeneous nature of the classes.

Such a revelation as this leads us retrospectively to that pernicious system by which teaching results were measured and paid for as a commodity. In those days the rural teacher's task was not particularly enviable. The weak staff existed in those days, although, fortunately, the student teacher had not appeared. To-day, however, we stand in the thin light of approaching dawn, assured by the sympathetic interest which the Board of Education has in recent years displayed in the question of rural education. An important manifestation of this is the modification of rural arithmetic schemes allowed by the Board, and set forth in the Suggestions to Teachers. This has been followed up by the outline of a scheme which may be found in Schedule 7 of the Suggestions on Rural Education. Welcome, however, as these concessions may be, nothing is done to improve the staffing weakness. This must ever be the source of disappointment, and at the same time a severe limit to the modifications counselled by the Board of Education. The extent of arithmetical teaching should be governed entirely by the acknowledged need of the child. Under present conditions it is decided by how much the teacher can teach, and influenced also by what the inspector anticipates.

Thus it is that the rural teacher must evolve a scheme to satisfy the peculiarities of his school and locality, and fortunately he is vested with full power to modify and elaborate as he thinks best. This, I am convinced, is the first step to success in such an important subject. Published schemes, which usually are intended for large schools, are useful as guides, but they demand so much time to adapt that it is better to build up a scheme by itself. This scheme should aim primarily at using the material which abounds in field and garden and market as data for problems, and that there is a wealth of such material is very evident. This fact is well known to every rural teacher, and it is nicely expressed in the following excerpt which is taken from an article on "The Village School" in the *Nineteenth Century* of November 1907: "Let arithmetic refer less to the Stock Exchange, and more to the farm and garden." In the Suggestions on Rural Education, the same thought is aptly put: "It is not by working difficult examples that the rules of arithmetic are fixed in the memory—rather the reverse—but by exercises in things that involve personal observation and measurements by the children, and that are concerned with their everyday experience while they are at school, and are essential to their everyday occupations after they leave." It would be well with the rural arithmetic scheme if its policy were exclusively expressed in these words.

Such a course of arithmetical teaching demands a great amount of practical work for the children; it involves a series of successive exercises in actual meas-

uring. This personal experience, particularly, means more to the country child than hours of patient book study than one would credit. It is, as it were, the manual approach to the subject. This means at once the localisation of the scheme, and on no account should its possibilities be limited to the schoolroom or the playground. It will be found necessary to visit the surrounding fields, especially in the work required in the higher classes. In the scheme given here in general outline no attempt has been made to introduce detail; in fact, this scheme is nothing more than a suggestive outline awaiting the modification desired by the individual teacher. In many cases throughout the standards opportunities occur for correlation with other subjects, and this in the country school with its complex classes means a great help. Thus by preserving the practical nature of the exercises much work may be accomplished.

A Three-Term Scheme of Arithmetic.

Introductory Notes.—In the lower classes the work will necessarily receive little rural bias, although, where it is possible, due reference may be made to country objects. In all cases the data should be collected by the children themselves by actual measurement, as far as possible. Much valuable information may be obtained from catalogues of farm implements, seeds, artificial manures, etc.

Standard I.

Term 1.—The four rules, with numbers not exceeding 25.

Term 2.—The same, with numbers not exceeding 50.

Term 3.—The same, with numbers not exceeding 100.

Standard II.

Term 1.—The four rules, with numbers not exceeding 250. Tables to seven times twelve. Simple analysis of the shilling. Farthings as fractions. Simple shopping exercises.

Term 2.—The four rules, with numbers not exceeding 500. Tables to nine times twelve. Analysis of the sovereign. Simple marketing exercises.

Term 3.—The four rules, with numbers not exceeding 1,000. Tables to twelve times twelve. Money rules to £5. Marketing and shopping business. Easy sales.

Standard III.

Term 1.—The four rules, with numbers not exceeding 10,000. Money rules to £25. Simple and compound multiplication and division. Costs of farm stock, carts, implements, and harness.

Term 2.—The four rules to 50,000. Money rules to £50. Compound multiplication and division. Costs of seeds and plants. Costs of shop articles. Household accounts. Simple farthing transactions.

Term 3.—The four rules to 99,999. Money to £100. Harder examples on sales, buying and selling.

Standard IV.

Term 1.—The compound rules applied to length and time. Length of furrows, drills, and hedges. Time taken in farming operations. Rate of working. Cost of timber and agricultural commodities. Cost of carriage per mile.

Term 2.—The compound rules applied to weight and capacity. Weight of hay, straw, and meal and cake. Cost of labour and material, grain, manures, and food. Wholesale and retail prices. Capacity of churns. Dairy marketing.

Term 3.—The compound rules applied to length, time, weight, and capacity. Harder exercises. Scale drawing and graphic representation. Simple decimals worked from the metric scale.

Standard V.

Term 1.—Simple vulgar and decimal fractions. G.C.M. and L.C.M.

Term 2.—Simple practice. Bills. Farm, dairy, and garden accounts. Discount on sales for cash. Invoices.

Term 3.—Proportion. Areas with scale drawing. Wages. Number of plants and trees to the acre and rod. Estimates for planting and sowing.

Standard VI.

Term 1.—Fractions. Harder practice. Bills. Percentages. Composition of foods, meals, and manures. Cost of farming, fencing, digging, hoeing, and ditching. Piece-work and time-work.

Term 2.—Areas of rectangular and triangular spaces. Practical methods. Irregular spaces. Circles. Profit and loss. Interest and banking accounts. Fall and rise of market prices. Land values. Live and dead stock.

Term 3.—Cubical contents. Capacity of cisterns, haystacks, rooms. Cubic yards of soil moved in digging, ploughing, and draining. Volume of timber. Quantity of bricks required in building, and costs. Gunter's chain. Simple bookkeeping. Income tax. Rates and taxes. Rates of insurance.

PRACTICAL NOTES ON SCHOOL GARDENING FOR MAY.

BY BRUCE COOK, CHINGFORD.

As the Whitsuntide holidays fall in the middle of May this year, perhaps a few words about the management and care of the school garden during holidays may be of use to many.

Where the garden ground adjoins the school, the caretaker may be asked to give an eye to it during the absence of the teacher from home. Where the caretaker lives on the school premises, of course, he should be responsible, especially during the summer vacation, and when there are any fruit trees planted in the plots. Where the teacher lives in the schoolhouse, he should arrange for garden monitors to visit the garden and keep weeds down, and do any necessary watering, etc. The holiday problem is one that is not easily solved when the successful work in the school garden is being considered.

For instance, last year some fruit bushes and fruit trees were received the morning after we broke up for the Easter holidays. What was to be done? They could not be left in the package for upwards of a week; consequently a postcard was sent to the lads belonging to the garden class asking them to be at the garden at a certain time. Most of them attended, and (after the roots of each had been well soaked in a pail of water) we planted them, explaining the process as the work proceeded.

Some county education committees, where a jobbing gardener is engaged to give the gardening lessons under the supervision of the head teacher, only pay the instructor for work done during the school session. During holidays no lessons are given, and therefore no pay is made. Who looks after the garden? This problem should be faced by the teacher introducing gardening for the first time into his or her school.

Should the garden be left to take care of itself during the Easter and Whitsuntide holidays, the work omitted during such holiday period can soon be done. But what about a month's holiday, say in August? If no arrangement is made for the care of the garden during such a long period, the garden will be found covered with weeds, crops spoilt, and fruit lost on the return after the summer holidays.

Notebooks.—Each scholar should be provided with a notebook. We use books 7″ × 4½″, which are easily slipped into the pocket.

Encourage the lads to enter the date of the sowing of the various seeds, when they flower, when seed is ripe, etc. Let the lads keep their books and pencils with them when gardening, in order that they may enter any difficulty met with, or anything worth recording, such as pests. Never mind if the book gets dirty. The entries can always be copied into another clean book during the ordinary school lessons. One of

THE WRONG WAY OF HOLDING THE SPADE WHEN DIGGING.

my lads who had the dirtiest rough notebook was by far the most intelligent and most successful of the scholars attending the gardening lessons, and obtained a special prize for his work. The state of the weather, work done, plan of plot, etc., should also be entered.

Hoeing and Weeding.—During the whole of this month keep the hoe busy in the garden, not only to keep down the weeds, but to stir the soil between the rows and plants.

Thinning of the various crops should be done as soon as the plants are large enough. (Refer to last month's notes.)

Onion and Leek plants may still be planted out in good rich soil about 9 inches between the plants and 1 foot between the rows.

VEGETABLE CULTURE.

Potatoes should be watched, and if any growths are seen above the soil during this month, carefully draw some light soil over such growths in order to protect them from the frost. It is important to impress the necessity of this upon our youthful gardeners, for if these early growths are severely caught by the frost, it means that it retards the growth for about a fortnight; or to put it in another way, the tubers will not be ready for digging until about two weeks later than if they had not been nipped by the frost.

Tomatoes.—The ground might be got ready for planting these out after the 1st of June. Good crops can be obtained from plants grown in the open, provided we have a sunny summer, and that large, sturdy plants (showing the flower trusses if possible) can be obtained ready for planting out after the 1st of June, when all danger of frost is passed. If possible, choose a warm sunny site, with fairly rich soil. We will refer to outdoor tomato growing next month.

Cabbage plants from the seed bed may be planted out in rows about 18 inches between the plants, and 2 feet between the rows.

Before planting see if there is any sign of the "club root" disease. This may be known by knots or swellings on the roots. Here we have an important and instructive lesson for the lads. In certain districts the club root is seldom seen, in others cabbages never thrive owing to attacks of this disease. Some years ago I had a piece of ground badly infested, and consequently I was unable to grow either cabbages, brussels sprouts, or cauliflowers successfully. I was determined to succeed, and tried dressing the infected ground with gas lime in the autumn, but with no good result. Exposure of the ground in winter had little effect. After some years, I got rid of the pest by burning every particle of a diseased root. It is a practice sometimes to bury diseased roots, etc., of various kinds. Never do this—always burn the same.

It is a good plan to prevent the possible introduction of this pest with any young cabbage plants obtained from other gardens by mixing some soot and clay in an old pail to about the thickness of cream, and to dip all roots into this before planting. "Prevention is better than cure." Should any lad's father find any of his cabbages or brussels sprouts with these growths on the roots, ask him to send them along to the school, and explain the matter to the class.

Kidney Beans or *Dwarf Beans* should be grown in every plot. They are not particular as to soil or position. Of course, all crops, as a rule, do better on well-manured, rich, deep soil. The great point to avoid in growing this crop is overcrowding. The seed may be sown in drills any time during May. If they appear above ground before the 1st of June, cover the young plants with light dry soil, and so protect them from frost.

The drills should be about 18 inches apart. Sow the seeds, say, 4 inches apart, and after all danger of late May frosts are passed, thin to say 10 or 12 inches from plant to plant. Should any have missed or have been frosted, etc., transplant those not required, or give them to the lads.

It is of the greatest importance to keep the beans well picked when young. Do not on any account let any pods run to seed, as this at once stops the plant from producing fresh pods.

Runner Beans or *Scarlet Runners* should be grown in every general plot, and also in every boy's plot, if room will permit. Perhaps no plant is so generally grown in the rural and suburban garden.

They do best on well-manured, deeply-dug soil. I recommend (if grown in rows) to dig out a trench about 1 foot in depth, and 18 inches in width, throw in 6 inches of well-rotted manure, and tread firm. Fill the trench to within 1 inch of the top with light soil. Plant the seeds in two rows 6 inches from seed to seed. By leaving a depression of about an inch it is much easier to water the plants later on, as when in full bearing they require plenty of water to the roots. They repay for copious spraying with water when in flower and pod during a long spell of dry weather.

They may be grown successfully in groups, and if seeds of white and scarlet flowering varieties are sown alternately, they are most ornamental as well as useful.

THE CORRECT WAY OF HOLDING THE SPADE WHEN DIGGING.

Keep slugs from attacking the young growths just as they appear above ground. Soot dusted lightly between the young plants generally protects them from the ravages of slugs.

Be careful to see that no young plants are left exposed during the night until the 1st of June, except in sheltered positions, as the runner bean is not quite so hardy as the dwarf variety.

They are generally trained up sticks or strings, but the boys should be shown how to grow them without either—namely, to keep pinching out the long young growths once or twice a week. They then make a kind of a bush about 2 or 3 feet through, and are covered with bloom and pods. Care should be taken in picking when grown in this manner, which is often adopted when grown in fields. Do not let the plants produce stringy and old pods. You can prevent this by picking the beans frequently. Once you allow old stringy beans to hang on the plant, it begins to cease bearing. Keep all beans picked off when they get to a certain size, whether they are wanted or not.

With generous treatment runner beans will grow to a height of 11 or 12 feet, but we do not advise letting them grow over 7 feet. When they have reached that height, keep topping them—that is, pinching out the growth above that height.

Vegetable Marrows may be planted out during May, providing they can be protected from frosts during the night, for vegetable marrows are particularly liable to frost. We do not advise growing them on each plot, as they take up too much room. Any unused corner in the garden will do, provided there is room for

BUSY WITH THE "NOTEBOOKS."

the plant to ramble. After selecting the spot, dig out the soil, say 2 feet in depth and 3 feet square, and place 18 inches of well-rotted soil in this space. Tread well, and cover with 6 inches of fine soil. Sow six seeds at convenient distances apart. Cover with a frame or box, or even inverted flower pots, during the night to protect from frost. Remove during the day, especially when plants are well above ground, otherwise they grow weakly, and do not fruit well afterwards.

When the plant has grown, say, 2 feet in length, pinch back the main growing stem. Say you pinch or cut away 3 inches from the growing point, this causes the laterals to grow, and these carry fruit later on.

Points to be observed in growing Marrows.—Always keep the plants well watered, and pick the marrows when small, say about 6 inches in length, for the flavour is then better, and by cutting them when they are that size you obtain a much larger number of marrows than when you grow giant specimens.

Late Peas should be sown. These are sometimes sold under the name of "Main Crop Peas." "Ne Plus Ultra" (grows 5 feet in height) and "Pride of the Market" (2½ feet in height) are two suitable varieties. For culture, see last month's notes. Peas sown in May should be ready to pick in late August and September.

Beetroot is generally sown in May, especially the main crop. See notes for last month for cultural directions.

Celery trenches are often prepared in May.

FRUIT.

Strawberry plants should have straw placed carefully between the plants to keep the fruit clean.

Fruit trees may be sprayed with soapsuds or an insecticide should any aphides be seen.

It is not too late to mulch all fruit trees with rich old manure. The rain washes the goodness down to the roots, and helps the growth of the fruit. Should farmyard manure be scarce, apply "Clay's fertiliser." It can be obtained from any seedsman, or direct from Clay and Son, Stratford, London, E.

Gooseberry bushes should be watched. Should the caterpillar appear, dust at once with soot or lime. Some recommend spraying the infested bushes with a hellebore spray. But this should only be done in extreme cases, as hellebore is a deadly poison, and should never be used if the fruit is to be picked within several weeks of the application.

Apple trees should be at once sprayed should the apple sucker appear. This is one of the most destructive of the insect pests. The eggs generally appear towards the end of April. As soon as they are hatched, the young apple suckers attack the buds by biting through the outer cover, and sucking out the goodness from them.

The best remedy is to spray the trees just before the blossoms open with a spraying solution made by mixing twenty ounces of tobacco powder with four gallons of water.

FLOWER CULTURE.

In order to run no risks, do not plant out geraniums and other tender plants until after the 24th of May in the south of England and the 1st of June in the north.

Annuals may be still sown in the open. They will bloom in late autumn.

Dahlia plants should be planted out in rich soil towards the end of the month. Protect the young plants from slugs by dusting lime or soot round the plants.

Stocks (ten-week) should be planted out in fine rich soil. It is most important that the plants be put out into fine soil. If the soil is lumpy, dig out a hole with the trowel, fill this with fine soil, and plant the stock therein. This gives the young plant a good start. Always, if possible, plant out in dull showery weather. In dry sunny weather protect the plant from the rays of the sun by laying sheets of newspaper, cabbage leaves, etc., over them, and by careful watering after planting.

Wallflower seeds should be sown for blooming next spring. Sow the seeds in drills in rows 8 inches apart. Transplant the seedlings 8 inches apart, and water well.

Roses need careful attention during May. Should any suckers be seen growing up from the roots, remove them at once by cutting them off as near the root as possible.

Any roses recently planted should be mulched with short manure, but on no account apply Clay's fertiliser, or any artificial manure, to newly-planted ones. Old bushes benefit greatly by a dressing of Clay's if applied this month. Should mildew appear, dust the foliage at once with flowers of sulphur. Watch for aphides. If any are seen, syringe with soapsuds or some insecticide. Then about two hours after well syringe with clear water.

Keep a sharp lookout for caterpillars and maggots. The best way is to pick them off by hand. Pinch any curled leaves you see, and you will generally find a little maggot rolled up in it. If large specimen roses are wanted, remove the small weakly buds surrounding the large main bud.

ANSWERS TO CORRESPONDENTS.

X. Y. Z.—Yes, certainly. Let me know result.

BEGINNER.—Heavy clay soils are best dug over, and left rough in November. This lightens soil, etc. Light sandy soils may be dug at any time.

ANXIOUS.—I will post you a copy direct.

RURAL.—No child is permitted, as a rule, to belong to a gardening class under eleven years of age. For exceptions, see Section III. 14 of Code.

LADY TEACHER.—Yes, a lady teacher can teach this subject, and girls can be recognised as students in the class.

ESSEX.—There are about eighty school gardens at work in the county of Essex.

PRO BONO PUBLICO.—I will touch on this fully in the June notes.

SPADE.—For the right and wrong way of holding the spade when digging see photos in this issue. Full instructions as to digging will be given in October next.

NATURE NOTES FOR MAY.

BY RICHARD MORSE.

Buttercups.

ALTHOUGH buttercups are very abundant almost everywhere during this month, they are frequently quite overlooked by both teachers and scholars in their ofttimes vain search for rarer specimens. This is to be regretted, for although these flowers are so well known, they may be made the subject of valuable lessons in observation; and one will be surprised to find what a host of important points had been previously overlooked, and what an interesting object even a common buttercup may become.

It should first be noted that there are at least three species of buttercup which are almost equally common just now, but to the inexperienced eye all appear alike.

A good plan is to gather a fairly large quantity from meadows and waysides, and compare one with another, carefully noting any ways in which they differ. If this be done, one is almost certain to quickly come across some flowers with sepals turning quite back upon the stalks, as shown in Fig. 1, leaving the petals with practically no support. Such sepals are known botanically as "reflexed." Other flowers will now be noticed with sepals spreading out under the corolla, and not exhibiting even the slightest tendency to curl back (Fig. 2). Children not

Fig. 1.—Flower of Bulbous Buttercup, showing reflexed sepals (*s*).

Fig. 2.—A, Flower of Buttercup, showing spreading sepals. B, Under side of same.

infrequently try to explain this by saying that the flowers are not sufficiently advanced, and that the sepals will become reflexed as the flower matures. They must, under such circumstances, be led to observe that such is not the case by examining a large number of flowers of both kinds. It will then be found that comparatively "young" flowers of the former kind have their sepals reflexed, while those of the latter kind are always spreading, no matter at what stage of growth they may be, unless, of course (as is frequently the case with more advanced flowers), they have fallen off altogether.

Now, even amongst those flowers with spreading sepals, two distinct species may be found, and perhaps the easiest means of distinguishing one from another is to compare the flower-stalks. Some of these will be found to be furrowed or grooved, while others will be rounded, and free from any signs of furrows whatever.

Here, then, we have the three distinct species above referred to. That with the reflexed sepals is the bulbous buttercup (*Ranunculus bulbosus*) (Fig. 3); and of the remaining two that

Fig. 3.—Bulb of Bulbous Buttercup (*Ranunculus bulbosus*).

Fig. 4.—Petals of Buttercup, showing nectaries.

with the furrowed flower-stalk is the creeping buttercup (*Ranunculus repens*), with runners resembling those of the strawberry; and the other is the meadow buttercup, the species which perhaps more than any other deserves to be called the "common buttercup."

It should be mentioned that there are many other more or less common species of buttercup, but the above three have been chosen as those over which mistakes are most frequently made.

Having learned to identify each of these, there remain many interesting facts regarding buttercups in general, most of which one's pupils can be led to discover for themselves by careful questioning. Space will permit a few only of these to be mentioned here; but it is hoped that the brief notes to be given will lead to further observations being made by both teachers and taught.

It is a common belief in many country districts that the bright colour of farmhouse butter in spring is due to the buttercups which the cows eat; but a careful observer will note that these flowers are seldom, if ever, eaten by those animals, and abundant specimens, quite intact, may invariably be found in pastures where cows feed, while the herbage all around has been bitten off. The reason for this will be readily understood if a small piece of the stalk or flowers be chewed. Indeed, Loudon has told us that the buttercups of our pastures "are well-known poisons of cattle;" and further, that "blistering plasters are made in Iceland of the leaves of *Ranunculus acris*"—that is, the meadow buttercup above mentioned.

It should be noticed that as night comes on the flowers of the buttercup usually partially close and droop, and this forms a convenient opportunity to refer to the "sleep" of plants. Older scholars may be able to suggest that this action of closing and drooping is possibly to exclude the dew. (The snowdrop, scarlet pimpernel, and others might here be referred to.)

The value of the alternation of sepals and petals (Fig. 2) in keeping out rain, etc., from the buds should not be overlooked when the usual uses of the calyx are being taught; and reference should also be made to the use of the bright-coloured petals, with their pocket-shaped honey glands, or nectaries, in attracting insects for the purpose of cross-pollination. Further, it is interesting to note that the stamens are what is botanically known as proterandrous—that is, they mature before the pistils. The anthers of the outside stamens are the first to shed their pollen, and bees visiting these flowers are practically certain to carry away with them some pollen to the fully matured stigmas of another flower. Before, however, the numerous stamens have all discharged their pollen, the stigmas have usually arrived at maturity; and if a flower be examined at this stage, one may often find the inner stamens actually touching them. It would, therefore, be reasonable to infer that self-fertilisation must, on some occasions at least, take place, if only to a limited extent.

May Flies.

Towards the end of this month the May flies (Fig. 5) appear in enormous numbers, and no lover of Nature ought to miss seeing their well-known "dance" over pond and river. Their whole life-history, indeed, has been one of extraordinary interest. The eggs were, in all probability, laid at least two years ago, and almost ever since that time the larvæ and pupæ have lived a more or less uneventful life at the bottom of some pond or stream. The larva is a most peculiar-looking creature (Fig. 6), and owing to its being esteemed such a delicate morsel by the numerous carnivorous inhabitants of the water, it spends most of its life in a sort of U-shaped burrow, which it makes for itself in the mud at the bottom of the stream by means of its specially adapted front legs.

There is no definite change from the larval to the pupal stage, as is so often the case in insect life, but instead a long series of moults; and as each pupa at last matures, it creeps out of the water and up the stem of some water-plant or other suitable object, there to await the marvellous transformation which is about to take place. Its skin soon dries and splits, and the well-known "Green Drake" of anglers appears. This is a greenish-coloured fly—and apparently a perfect insect—with large gauzy wings and (usually) three slender filaments, often longer than the whole body, behind.

If it now be carefully watched, it will be found to flutter only a short distance away, when it will alight again on a neighbouring tree, or some other suitable resting-place. Ere long its skin once again dries and splits, and at last the perfect insect makes its appearance, for the change to the first winged form was but another of the many moults through which this insect goes before attaining maturity.

N.B.—It is very interesting to search the trees round about for the empty skin cases, for in a suitable neighbourhood hundreds of them may often be found, clinging, as it were, to the branches and twigs.

This second winged form, or true imago (Fig. 5), differs but little in general appearance from the first. The greenish colour, however, has now vanished, and anglers call this perfect insect the "Gray Drake," in accordance with its changed tint. More-

over, the tail filaments are longer and the antennæ shorter in the true imago, and the wings, too, strike one as being far more delicate.

A remarkable feature of this "perfect" insect is its absolute inability to take food in any form, either solid or liquid, for its mouth parts appear to be in such a rudimentary condition that it has practically no mouth at all. Its life as a perfect insect, however, is so extraordinarily brief that no food is required.

Fig. 5.—May Fly (perfect insect).

Fig. 6.—Larva of May Fly (enlarged).

Many do not emerge until sunset, or even later, and yet before the next day dawns almost all of them have ceased to exist. The winged form seems to be assumed for one purpose only—namely, the perpetuation of its species; and after the eggs have been laid in the water, the parents, having no further object in life, pass away.

It is said that the dead May flies are found in such enormous numbers in some parts of Europe that they are gathered into large heaps and used for manuring the fields.

The Hedgehog.

The hedgehog's life is a most interesting one; but as the animal is seldom abroad when most country walks are taken, it is comparatively rarely seen. During most of the day it is asleep in some ditch or wood, rolled snugly up amongst moss and leaves; and even if not completely covered, it is scarcely likely to be noticed, for its somewhat dirty-brown appearance forms an excellent example of protective coloration.

At dusk, however, it leisurely unrolls itself, and begins its rambles in search of food; and those, therefore, who wish to observe its interesting habits in the natural state should make a practice of taking an occasional evening walk in a suitable neighbourhood. Doubtless many of these twilight walks will be disappointing, but if persisted in, and different vicinities be frequently chosen, one is certain sooner or later to be amply rewarded for his pains; and if the aid of a local gamekeeper (a most useful person to the Nature lover), or even that of his children, can be secured, he will probably not have long to wait.

Fig. 7.—Spines of Common Hedgehog.

One will soon gather that to the farmer at least the hedgehog is a most useful little animal. It is a most voracious feeder, and its appetite seems almost insatiable. Its chief food consists of slugs, snails, worms, caterpillars, various large insects, and occasionally frogs, grass-snakes, and birds' eggs; but it is also, to a certain extent at least, a vegetable feeder, not infrequently being known to eat various roots, and so forth. It is probably because of its fondness for eggs that it is so often found upon the keeper's gibbet, surrounded by stoats, jays, and the various other enemies of the gamekeeper.

If a living hedgehog cannot, in spite of continual searching, be obtained, many interesting facts may be gathered from even a cursory examination of a (freshly killed) dead specimen, which is usually more easily procurable. The resemblance of its black snout to that of the animal after which it is named will be at once evident. Its short legs and tail should also be noticed, as, owing to the former, its movements are as a rule characteristically slow (though on some occasions it may be caught running with considerable activity). To compensate for this lack of speed as a means of self-defence (compare the hare, etc.), it has its magnificent coat of spines, and, when rolled up into a ball, is practically safe from the attacks of most of its enemies.

Each spine is shaped very much after the style of a bent pin, as shown in Fig. 7, the "head" being beneath the skin to hold the spine in position, and the bend serving to give the necessary elasticity, so that pressure on the spines does not give pain to the animal. It is said that when a hedgehog desires to descend a steep bank or such-like place, it merely curls up into a ball and rolls to the bottom; and even a sudden drop of several feet does not appear to cause it the least inconvenience, probably owing to the shape of the spines.

During late autumn the hedgehogs gradually disappear from the countryside, for being hibernating animals, they go into hiding as the cold weather approaches. Their winter quarters are frequently deserted rabbit burrows, though many appear to be quite comfortable at the bottom of a dry leaf-filled ditch, or similar sheltered situation. Needless to say, they are seldom disturbed; and when at last they awaken from their long winter's sleep, and get once more abroad, they appear—as a result of their long fast—ready to eat almost anything that comes their way, having been known on some occasions to attack even rabbits and leverets.

Miscellaneous Notes.

Those teachers who keep chrysalides in the classroom for observation have, no doubt, often been disappointed to find that, no matter how long some of them are watched, no butterfly comes forth. At last all hope is given up, and an apparently dead chrysalis is taken into the hand and carefully examined. A tiny round hole may be discovered in the outer covering, and it soon becomes evident that the supposed chrysalis is nothing but an empty shell. Perhaps some tiny black flies are noticed round about, or quite possibly a large number were discovered one morning in the case where the chrysalides were kept; but these are now the only signs of life to be found there.

The trouble has all been caused by a minute insect known as the ichneumon fly, which pierces holes in living caterpillars, and deposits often some thirty or forty eggs in the wounds thus made. These quickly hatch into tiny grubs, which at once commence feeding on the body of the unfortunate caterpillar, but avoid, by some marvellous instinct, its vital organs, as if realising that their own lives were directly dependent upon that of their unhappy host. If the latter have sufficient vitality left, it will, of course, ultimately undergo the usual transformation and become a chrysalis, but *never* a butterfly, for the parasites now devour vitals and all. Finally, they themselves pupate, and soon emerge as the crowd of tiny black flies above mentioned.

Those who have sufficient patience to carefully watch those greenish caterpillars with which our cabbages are usually infested may one day be rewarded by seeing one of these ichneumon flies perform its deadly work. As each wound is made with the sharp, piercing organ with which the female ichneumon is provided, the caterpillar will be seen to wince or squirm somewhat; but it continues to feed, and appears to suffer no further pain. If now this caterpillar be kept in captivity, and liberally supplied with fresh cabbage leaves, some very interesting observations may be made. It not infrequently happens that when the larva ceases to feed, the grubs eat their way out, and spin bright yellow cocoons for themselves on the spot, and in the midst of these is generally seen the shrivelled and faded covering of the ill-fated caterpillar.

The beautiful nest of the long-tailed titmouse should be most carefully searched for during this month. It is a marvel of ingenuity, oval in shape, and composed of moss, wool, feathers, lichens, and a host of other articles, and is generally found in bushes—particularly gorse—and hedges, but is by no means common. The tiny eggs (usually about eight to ten in number) have a few reddish spots on a white ground.

Many of our forest trees are in bloom this month, and form interesting objects for daily observation. The pendulous catkins of the oak are fairly well known, but the tiny acorns in their early stages are almost never seen.

The hornbeam, so plentiful and ornamental in Epping Forest and in other parts of Essex and neighbouring counties, is also hanging forth its characteristic catkins, which amply repay a close examination, especially if one use a good lens.

Other trees well worth hunting up this month are the hawthorn, birch, beech, ash, wild cherry, Scotch fir, and horse-chestnut.

MODERN SCIENCE NOTES.

BY J. G. M'INTOSH, B.SC., SECONDARY SCHOOL, GATESHEAD.

"The Movement of the Poles."

THE successive great changes in the configuration of the earth's surface, as revealed by geological study, have been, among experts, subjects of detailed examination, calculation, and speculation for some considerable time. That vast tracts of present-day land have been deeply submerged at one period of the earth's history, and former continents have now disappeared, leaving only the summits of their mountain peaks visible, has been well established. Even during the present day evidence of these changes is not wanting. The level of the eastern lakes in the North American chain is slowly rising and sinking on the western side. The Hawaiian islands are also rising, while Heligoland is just as surely sinking. Only recently, to account for these various results, there has been advanced an interesting theory, which seems destined to explain many of the problems which have baffled geologists for many years.

Every one is familiar with the fact that the earth performs two movements—a daily rotation on its axis producing day and night, and an annual revolution causing the change of seasons. To these chief movements are now added a pendular motion of the poles. The theory is now advanced that the earth's poles perform slow and regular oscillations in such a way that the North Pole travels gradually towards the equator along a certain meridian, and after a definite interval of time returns along the same meridian to its mean position. It then proceeds to complete its oscillation, the period of which is calculated at about 20,000 years. If this be the case, any axial displacement will result in a change in the direction of rotation, and therefore of the centrifugal force at every point. The tendency of the spheroid to flatten at the poles and bulge at the equator still remains, but the regions in which these movements take place will continually change. Further, the effect will be accentuated more strongly in the case of water than of solid rock masses of land. Hence, if the North Pole were to move towards Europe, the waters of this continent will tend to flow southward, and the land masses to rise above the sea-level; while in Equatorial regions the land level would appear to sink. The net result, therefore, would be to increase the area of Europe and decrease that of Africa. At the present time the period of oscillation is in the opposite phase. Europe is apparently decreasing in area, while the Hawaiian islands are rising above the sea-level.

According to calculations which have been made, the poles oscillate along the meridian 10° E. longitude from Greenwich, and its supplement 170° W. longitude.

These meridians form a great circle of oscillation passing through Germany, Italy, and Africa. The polar distances and latitudes of all places on this meridian change more rapidly than those of any other points on the earth's surface, whose changes will be inversely proportional to their distance from this meridian. There will be two points on the earth's surface where no such changes occur. These points will be equidistant from the circle of oscillation, and are situated in Sumatra and Ecuador. According to the theory advanced, they will be subjected to the maximum centrifugal force, and hence a line joining them should measure the greatest diameter of the earth. That this is so seems in itself a strong confirmation of the theory.

If the meridian of Ecuador 80° W. longitude be followed, it will be found to bisect the North American lakes. The eastern half are nearer the meridian 10° E., and the western half nearer 170° W. Hence, with the present polar movement, there will be a rise of water-level in the eastern lakes and a fall in the western. The same argument may be applied to explain the variations in height of coast lines, coral reefs, etc.

The most important effects of this polar variation would be climatic, for the moving pole carries the Arctic climate with it. The climatic changes will be greatest in places situated on the circle of oscillation, diminishing gradually with increase in distance from this circle. Hence the climate of Sumatra and Ecuador has remained unchanged through all time.

Adaptation to climatic conditions being a primal necessity for the survival of any species, it follows that the polar oscillations must have exercised a stupendous influence upon the distribution of species. Animals which, like the huge saurians of the past, were unable to adapt themselves to climatic conditions, had either to migrate or perish. The need for migration would be greatest near the circle of oscillation, and its general trend to the east and west in a tropical direction. This affords an explanation of the occurrence of like species in widely separated regions, and the identity of the fauna and flora of tropical mountains with those of low-lying plains in the temperate zones.

Of the species left near the circle of oscillation, the changes in their evolution brought about by natural adaptation and selection would be most varied. Thus the fauna and flora of Australia, being remote from this circle, still retain those characteristics which prevailed in Europe and North Africa during the Tertiary geological epoch. On the other hand, those countries traversed by the circle of oscillation have been the centres of creation of most of the animal and vegetable species of the eastern hemisphere. It is a remarkable fact that all known fossil remains of primitive man have been found near the 10th meridian of east longitude, and that along this meridian the greatest development of the human race has taken place.

Up to the present the recurrence of successive glacial periods has not been satisfactorily explained. According to the theory advanced, these periods represent the period of oscillation of the poles. During each period great changes took place in the distribution of land and water, and in climate and the distribution of species.

Reibisch and Simroth, who are jointly responsible for this ingenious theory, offer the explanation that the impact of a second moon with the earth near the region which we now know as Africa would cause sufficient impact to establish the pendulation of the poles. This is, of course, merely a matter of conjecture, but the theory agrees so well with ascertained facts that it is worth more than passing notice.

"The Struggle for the Decimal in Physics."

A recent number of *Die Deutsche Revue* publishes a summary of a lecture delivered in Amsterdam by Professor Voight of Göttingen on the progress made in methods of physical measurement. The title of the lecture was, "The Struggle for the Decimal in Physics." Professor Voight says:—

"What degree of exactness is attainable in physical measurement? That is the question. At the present day a thoroughly skilful cabinet-maker can put out work of which the dimensions are true to a per cent. that evokes enthusiastic praise. To physicists such a degree of exactness signifies really nothing, and they are constantly striving to attain a further decimal for all constants. Take, for example, the determination of the degree of the force of gravity, or, what is the same thing, the determination of the length of a pendulum for seconds. In his experiments with gravitation at the leaning-tower of Pisa, Galileo observed that the duration of the fall of an object dropped from the top of the tower was three and a half seconds. In this the initial and the final moment of the fall can be determined to 0·2 of a second approximately—that is, the exactness of the statement may depend on an eighth.

"For the solution of the problem, Huyghens used a pendulum that at once brought exactness to a thousandth, not because the initial and the final moment of the oscillation of the pendulum was measured, but because the number of oscillations was determined. So it was believed that correct figures were now determinable. Then the discovery was made that the length of the pendulum varied at different latitudes, and so a source of error was found. Again, there was hung before a clock a thread pendulum that was regulated until it struck the second; in this the investigator had to keep in view that one pendulum influences another, and thus exactness could again be enlarged. In 1730 Mairan discovered a new source of error—the stiffness of the thread of the pendulum—while he also kept in view the fact that the pendulum was really compound. Borda also found further sources of error in the influence of temperature, the extension of the thread due to centrifugal force during oscillation, and the effect of the carriage of a certain quantity of air by the ball of the pendulum. The effect of these corrections was to give a value of which the exactness was calculated to $\frac{1}{300000}$.

"A chronometer is a beautiful thing, but what can its accuracy to a second signify as an indicator for the observations of Foucault, who has measured the time that light takes to go a distance of twenty metres, and has determined it to the sixteen-millionth part of a second?

"For measurement of the length of light waves use is made of strips of silver, every millimetre of the length of which is marked with one thousand lines.

"A pendulum constructed for the measurement of angles has indicated a movement of the three-hundredth part of a second of angle. To grasp approximately the smallness of such a measurement, one needs only to imagine rays proceeding from the eye and striking at a distance of sixteen hundred kilometres the edges of a thin disc of one-inch diameter.

"Spectrum analysis, for instance, can indicate marvellously small quantities, even the millionth part of a milligram of sodium, which when burnt still betrays itself through a distinct yellow line in the spectrum."

Migrating Stars.

In an article in the *Fortnightly*, Professor H. Turner points out several strange affinities in the movements of stars far removed from one another in the sky. The great seven of Ursa Major, for instance, are not all related. The middle five are speeding in company away from the earth; the two pointers at the end are coming towards us. But these are not alone in the heavens. They belong to the same company as Sirius and other six stars, which are scattered widely over the sky. These stars move in parallel courses through the universe, and it is possible that our sun is one of the same cluster. These "migrating stars," as Professor Turner calls them, are now under close observation. Can it be, he asks, that they have some common association of birth—perhaps some vast nebula collected into stars billions of years ago, and yet retained in them its vast extension and its primeval velocity?

Professor Turner has some interesting remarks to make on the "personal equation" in observation. According to him, the simple notion of a constant peculiarity in each observer has been over-elaborated. The "personal equation" is changeable with a different instrument, or in different states of the observer himself. He tells a story in which he was associated with an eminent French astronomer in determining the longitude of Paris. At dinner he ordered a bottle of white wine as a change from red. His action was not approved. "Ca changera l'équation personelle" was the grave comment.

Ultra-Violet Photography.

From the recent results obtained by Professor Wood in photographing the moon by ultra-violet light, it appears likely that a new method of astronomical investigation is at our command. Up to the present time the method has only been applied to the moon, but it is quite possible that light may be thrown on the nature of the markings visible on other planets. The red spot on Jupiter, the polar effects on Mars, are both questions requiring solution. Professor Wood's method consists of making pictures of the moon by means of those rays, to which glass is opaque, but which are freely transmitted by a silver film. He employed a quartz lens heavily silvered on one side. With such a combination a thin sheet of clear window glass placed before the lens stopped all photographic action. In his early experiments with ultra-violet rays some curious results were noted. Photographs of a landscape did not differ greatly from the ordinary picture, while objects in full sunlight failed to cast any shadow. White garden flowers came out black, and Chinese white paint was blacker than ordinary printer's ink. Accident showed the extreme sensitiveness of these rays in detecting slight traces of the substances which absorbed them. This suggested the application to the photography of the moon, since it is evident that any extensive deposits invisible by any other means might be perceived in a photograph by ultra-violet light. Early experiments showed the presence of markings dark only in this light. An extensive deposit in the neighbourhood of Aristarchus, shaped like a figure 3, was clearly perceptible. The nature of this deposit is at present unknown, and is only likely to be ascertained by continual experiment and careful elimination. Professor Wood has tried many igneous and volcanic substances, but up to the present with no result. He is in the position of a man who has discovered a new line in the spectrum, and can only ascertain what it is due to by repeated experiments.

It has been suggested that photographs in the infra-red may supply additional information. In this case a light filter of dense cobalt glass and a strong solution of K_2CrO_7 seems suitable. With such a filter the sky appears jet black, and trees and grass white.

French Prize Competition.

1. All French translations **must be received not later than May 7, 1910,** and addressed to:—PRIZE EDITOR, Office of *The Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the *coupon* which appears on the Back Wrapper page of the current number. One coupon must be sent for each entry.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of **Half a Guinea** is offered for the best rendering into English of the following extract:—

Durant les jours quelquefois si ingrats de la semaine, quelle innocente et douce attente que celle d'unir sa famille à la famille de son ami, de son voisin, pour aller goûter un riant loisir sous les charmilles de la plaine ou sous les châtaigniers de la montagne! Que le soleil de dimanche paraît radieux, l'azur du ciel éclatant! Après les actes de dévotion qui sanctifient cette journée, de bonne heure, à midi déjà, car la chaleur du jour ne pèse point sur ceux que la joie allége, ces familles se répandent hors des murs, et la gaieté des visages répond au vivant aspect des habits de fête. Le pas des parents, celui de l'aïeul, s'il prend encore part à ces plaisirs, règlent l'allure; néanmoins on joue librement alentour, et la jeune fille, si elle cherche à plaire aux jeunes hommes, comme c'est son invincible penchant, protégée par l'œil de sa mère, n'est enchaînée ni par une fausse réserve ni par une triste pruderie. Les rires, les jeux, une gaie malice, un piquant attrait, rapprochent et animent cette troupe folâtre; les parents causent au murmure de cette joie, et derrière eux l'aïeul lui-même se ragaillardit au bruit de ces plaisirs d'un autre âge. Et ce ne sont là que des préludes. Ils arrivent sous la charmille; la fraîcheur, le repos, une table servie, les convient à la fois: et quels que soient les mets, l'appétit et le bonheur leur prêtent une saveur charmante. Les hasards, même fâcheux, d'une cuisine rustique, ne sont qu'un sujet de gaieté, une bonne fortune pour cette société sérieuse. Cependant l'aïeul est entouré d'égards, on lui fait le régime qui lui agrée, le bruit se tempère, pour lui, chaque jeune homme s'honore de lui témoigner du respect, heureux de se faire ainsi un titre de préférence auprès de la petite fille du vieillard.

From "Nouvelles Génévoises," by
RODOLPHE TÖPFFER.

RESULT OF THE APRIL COMPETITION.

The prize is awarded to "Naldera." (Will "Naldera" kindly forward name and address for publication?)

First Class.—Southchurch, Lalla Rookh, E. C. M., Undergrad, Ivanhoe, Pine, Childerton, Mena, Harrogate, Minna Troil, Nicolas le Porter, Holt, Trezise, Jan, Jim, Havashot, Xos, Yvonne, Bunny, Napoléon, Grimbarian, Triple, Amos, Le père Goriot, Dorma, Caen, Weary Willie, Larry, Colenso, Etudiante, Hard-up, Elad, Jean Bonhomme, Daphne, Queen Mab, Deva, Algol, Woodruff, Trans, Maud Müller, Eglinton, Ruth, Dot, Elba, Charles I., Beulah Benton, Rosalind, O. I., Irish Colleen, Pixie, Towser, Portia, F. G., Duchlage, Choc, Clapham, Relluf, Nell Gwyn, Germaine, Veritas, Jersey.

Second Class.—Hythlodaye, Madame de Maintenon, Winter, Toto, Myrtle, Mafeking, Hélène Vaughan, Cambrésienne, Anglia, Durham, A. N. M., Babs, Thrums, ——, Blue Bird, Maggie, Fleance, Cryf ffydd, La vérité, L. P. C. M., Woodstock.

The name and address of "Snowdrop," who gained the prize in the February competition, are:—Miss E. M. Morrogh, Ursuline Convent, Waterford.

We have not yet heard from "Peter Pan," who was awarded the prize last month.

REPORT.

The piece set was very interesting, but could hardly be called difficult. The French idiom *une croix à la main* avoids the difficulties which confront the English student in translating a descriptive phrase which is applied to more than one person. "A cross in their hands," as many translated it, is open to obvious objections. Some competitors wanted to improve on *forjure le royaume* by making it mean "renounced the world." It means exactly what it says, which is that those who had taken sanctuary could save their lives by promising to go into and remain in exile. The French word *pénitence* cannot be literally translated, as the English word "penitence" refers only to inward feelings, and not to their outward expression. The descriptive part of *Nicolas le Porter* need not have been translated.

PRIZE TRANSLATION.

All these criminals, without reckoning the support given by great men, had fine privileges. One would sometimes meet some of them travelling along the roads with crosses in their hands: king and holy church forbade such to be touched; they were people who had "forsworn the kingdom." When a thief, a murderer, or a felon of any kind, felt that pursuit was very close, he would rush into a church and find himself safe. The church was a sacred place, and whoever had crossed its threshold was under the protection of God. To drag men thence was a sacrilege which spelt excommunication. Nicolas le Porter had helped to drag out of the Church of the Carmelites at Newcastle some laymen who had taken refuge there, and who, when handed over to the civil authority, had been executed. To get pardon he was obliged to have recourse to the intervention of the papal nuncio, and to submit to a public penance very different from the customs of our time. "We command," writes Bishop Richard to the priest of St. Nicholas at Durham, "that on Monday, Tuesday, and Wednesday of the coming Whit-week he go, clothed in a shirt, and with bare head and feet, and be whipped publicly by yourself in front of the porch of your church, in the presence of the populace. He shall then himself proclaim, in English, the cause of his penance, and shall confess his fault; and when he shall thus have been whipped, the said Nicholas shall proceed to the cathedral church of Durham, bareheaded and barefoot and clothed as specified: he shall walk in front, you will follow him, and you will chastise him in the same way in front of the door of the cathedral those same three days, and he shall repeat the declarations which I have mentioned."

"NALDERA."

NEXT MONTH.

1. A practical and helpful Paper on "The Eyesight of School Children," by J. P. O'Hea, M.B., Lecturer to the London County Council.
2. A continuation of P. Madden's contribution on "British Decimal Weights and Measures."
3. An interesting Article entitled "A Visit to a Swiss Mountain School," by Mary S. Jacob.

Our Query Column.

SOLUTIONS BY A. CLEMENT JONES, M.A., PH.D., SENIOR MATHEMATICAL MASTER, BRADFORD GRAMMAR SCHOOL.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

G.P.—The point of support of a pendulum is moved horizontally with a given acceleration. Find the position of relative equilibrium and the time of oscillation.

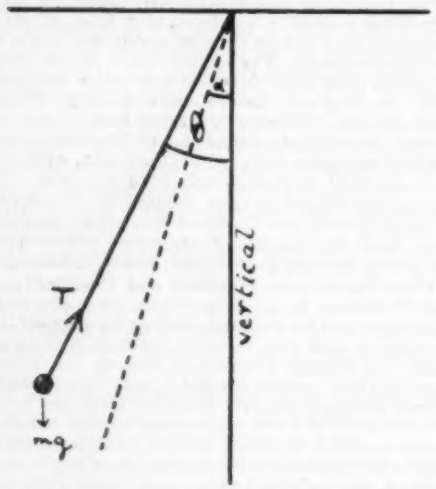
B.A., R.U.I. 1909.

If the pendulum were not oscillating, suppose it hangs at an angle α to the vertical.

Its acceleration is then the given horizontal acceleration of its point of support. Hence if T poundals is the tension of the string and m pounds the mass of the bob, we have

$$T\cos\alpha = mg. \quad \text{(Vertical resolution.)}$$
$$T\sin\alpha = mf. \quad \text{(Newton ii.)}$$
$$\therefore \quad \tan\alpha = \frac{f}{g}.$$

This gives the position of relative equilibrium. Now, if the pendulum oscillate about this position, let its inclination to the vertical at any time be θ.



Then the acceleration of the bob perpendicular to the direction of the thread is $l\frac{d^2\theta}{dt^2}$, measured *relative* to the point of support in the direction θ increasing.

Its whole acceleration in this direction is therefore

$$l\frac{d^2\theta}{dt^2} - f\cos\theta.$$

The resolved part of the forces acting on the bob in this direction is $-mg\sin\theta$.

Hence $$m\left(l\frac{d^2\theta}{dt^2} - f\cos\theta\right) = -mg\sin\theta.$$

$$\therefore \quad l\frac{d^2\theta}{dt^2} = -(g\sin\theta - f\cos\theta).$$

$$\therefore \quad l\frac{d^2\theta}{dt^2} = -\sqrt{f^2+g^2}(\sin\theta\cos\alpha - \cos\theta\sin\alpha)$$
$$= -\sqrt{f^2+g^2}\cdot\sin(\theta-\alpha).$$

Put $$\phi = \theta - \alpha.$$

$$\therefore \quad l\frac{d^2\phi}{dt^2} = -\sqrt{f^2+g^2}\cdot\sin\phi.$$

If the oscillations are small, ϕ is small, and we have approximately

$$l\frac{d^2\phi}{dt^2} = -\sqrt{f^2+g^2}\cdot\phi.$$

$\therefore$ as in the case of the simple pendulum with fixed support, the time of an oscillation

$$= 2\pi\sqrt{\frac{l}{\sqrt{f^2+g^2}}}.$$

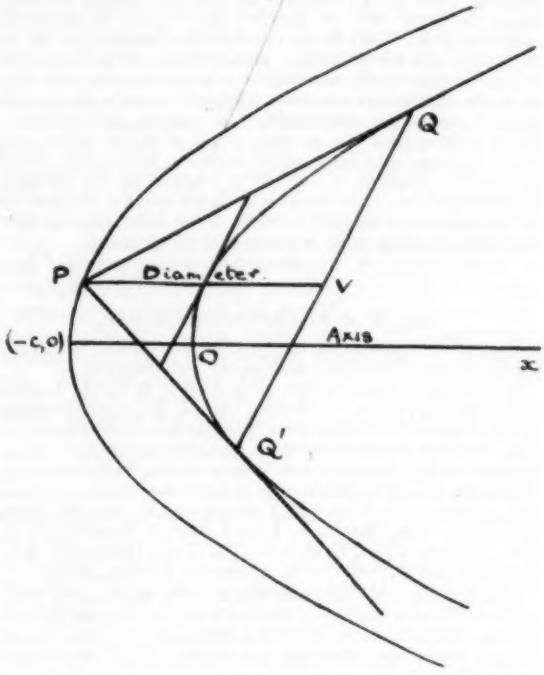
Ganymede.—Two parabolas have the same axis; tangents are drawn from points on the first to the second. Prove that the middle points of the chords of contact with the second lie on a fixed parabola. (Smith's *Conics*.)

Let the equation of the outer parabola be

$$y^2 = 4b(x+c). \quad \ldots\ldots\ldots \text{(i)}$$

and that of the inner parabola

$$y^2 = 4ax. \quad \ldots\ldots\ldots \text{(ii)}$$



The co-ordinates of any point P on the parabola (i) can be taken in the form $\{(b\lambda^2 - c), 2b\lambda\}$, and the equation of its polar Q Q′ with respect to the inner parabola (ii) is

$$y\cdot 2b\lambda = 2a(x + b\lambda^2 - c). \quad \ldots \text{(iii)}$$

Now, the diameter conjugate to Q Q′ passes through P; in other words the diameter

$$y = 2b\lambda \quad \ldots\ldots\ldots \text{(iv)}$$

bisects the chord Q Q′.

Hence, the lines (iii) and (iv) intersect in the point whose locus is required. Eliminating λ we have

$$y^2 = 2a\left(x + \frac{y^2}{4b} - c\right),$$

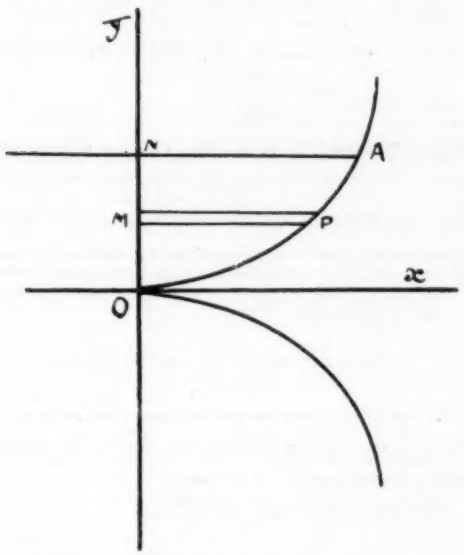
or
$$y^2 = \frac{4ab}{2b - a}(x - c),$$

which is a fixed coaxal parabola.

François.—The curve $ay^2 = x^3$ is revolved round the axis of y. If V be the volume and S the area of the part of the surface so generated contained between planes perpendicular to the axis of revolution, one through the origin and the other at a distance $\frac{8a}{27}$ from it, prove that $V = \frac{128\pi a^3}{5103}$ and $S = \frac{128}{1215}(\sqrt{2} + 1)\pi a^2$.

(B.Sc. Maths., 1909.)

Firstly the volume: If P is any point on the curve, and PM the ordinate to the axis of revolution, the volume generated by the revolution of the element length PM and thickness dy is $\pi PM^2 \cdot dy$, or $\pi x^2 dy$.



The total volume is then

$$= \pi \int_0^{\frac{8a}{27}} x^2 dy = \pi a^{\frac{2}{3}} \int_0^{\frac{8a}{27}} y^{\frac{1}{3}}\, dy$$

$$= \pi a^{\frac{2}{3}} \left[\frac{3}{4} \cdot y^{\frac{4}{3}}\right]_0^{\frac{8a}{27}} = \pi a^{\frac{2}{3}} \cdot \frac{3}{4} \cdot \frac{8 \cdot 8 \cdot 2}{27 \cdot 27 \cdot 3} \cdot a^{\frac{4}{3}}$$

$$= \frac{128\pi a^3}{5103}.$$

Again, if ds is the element of arc at P, the surface generated is $2\pi PM \cdot ds$, or $2\pi x \cdot ds$.

We will, in this part of the question, illustrate another way of treating the curve. Any point on the curve can be represented by co-ordinates of the form (at^2, at^3). Thus at the limit point A we find that $t = \frac{2}{3}$, and at the origin $t = 0$.

Now
$$\left(\frac{ds}{dt}\right)^2 = \left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 = 4a^2t^2 + 9a^2t^4.$$

$$\therefore \quad \frac{ds}{dt} = at\sqrt{4 + 9t^2}.$$

The element of surface generated is then

$$2\pi \cdot at^2 \cdot at\sqrt{4 + 9t^2} \cdot dt,$$

and the total surface

$$= 2\pi a^2 \int_0^{\frac{2}{3}} t^3 \sqrt{4 + 9t^2}\, dt$$

$$= \frac{2\pi a^2}{27} \int_0^{\frac{2}{3}} t^2 \frac{d(4 + 9t^2)^{\frac{3}{2}}}{dt} \cdot dt.$$

Whence, integrating by parts,

$$= \frac{2\pi a^2}{27}\left[t^2(4 + 9t^2)^{\frac{3}{2}}\right]_0^{\frac{2}{3}} - \frac{4\pi a^2}{27}\int_0^{\frac{2}{3}} t(4 + 9t^2)^{\frac{3}{2}}\, dt$$

$$= \frac{2\pi a^2}{27}\left[t^2(4 + 9t^2)^{\frac{3}{2}}\right]_0^{\frac{2}{3}} - \frac{4\pi a^2}{1215}\left[(4 + 9t^2)^{\frac{5}{2}}\right]_0^{\frac{2}{3}}$$

$$= \frac{128\pi a^2\sqrt{2}}{243} - \frac{512\pi a^2\sqrt{2}}{1215} + \frac{128\pi a^2}{1215}$$

$$= \frac{128}{1215}(\sqrt{2} + 1) \cdot \pi a^2.$$

G. Collis.—Show that

$$PA^2 \tan A + PB^2 \tan B + PC^2 \tan C$$

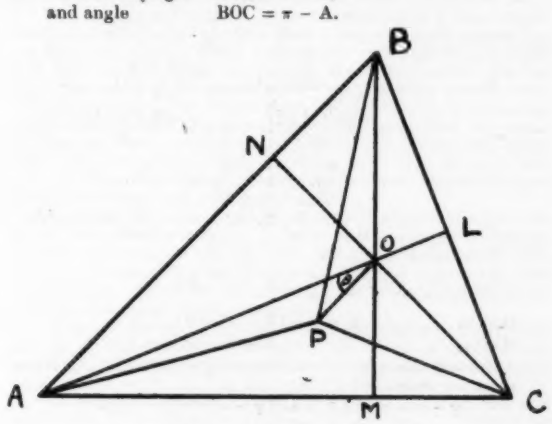
has its minimum value when P is at the ortho-centre.

(Edwards's *Diff. Calc.*)

Let O be the ortho-centre and P any point in the plane of the triangle. Call the length $OP = d$, and $\angle POA = \theta$.

Now the angle $AOB = \pi - C$,

and angle $BOC = \pi - A$.



Then in the triangle AOP we have

$$PA^2 = OA^2 + OP^2 - 2OA \cdot OP\cos\theta.$$

But
$$OA = AM \operatorname{cosec} C$$
$$= c\cos A \operatorname{cosec} C$$
$$= \frac{c}{\sin C} \cdot \cos A = 2R\cos A,$$

where R is the circum-radius of the triangle.

Hence $PA^2 = OA^2 + d^2 - 4Rd\cos A\cos\theta$.

Similarly, from the triangle BOP,

$$PB^2 = OB^2 + d^2 - 4Rd\cos B\cos(\pi - C + \theta),$$

also $PC^2 = OC^2 + d^2 - 4Rd\cos C \cdot \cos(\pi - B - \theta)$.

Thus, by simple trigonometrical substitution,

$$PA^2 = OA^2 + d^2 - 4Rd\cos A\cos\theta,$$
$$PB^2 = OB^2 + d^2 + 4Rd\cos B\cos(C - \theta),$$
$$PC^2 = OC^2 + d^2 + 4Rd\cos C\cos(B + \theta).$$

Hence $\Sigma PA^2\tan A = \Sigma OA^2\tan A + \Sigma d^2\tan A$
$- 4Rd[\sin A\cos\theta - \sin B\cos\overline{C - \theta} - \sin C\cos\overline{B + \theta}]$.

Now $\sin A\cos\theta - \sin B\cos\overline{C - \theta} - \sin C\cos\overline{B + \theta}$
$= \cos\theta\{\sin A - \sin B\cos C - \sin C\cos B\}$
$- \sin\theta\{\sin B\sin C - \sin C\sin B\}$
$= 0.$

Thus $\Sigma PA^2\tan A = \Sigma OA^2\tan A + d^2\,\Sigma\tan A$,

and evidently $\Sigma PA^2\tan A$ is a minimum when d is zero—that is, when P is the ortho-centre.

E. S. Smith.—Find that normal to

$$\sqrt{xy} = a + x$$

which makes equal intercepts upon the co-ordinate axes.

The equations of straight lines which make equal intercepts on the axes (positive or negative) are of the forms

$$x - y = c \text{ and } x + y = c,$$

where c is any constant.

Thus they make angles $\pm \frac{\pi}{4}$ with the axis of x, and consequently the tangent of the inclination of the normal to the x-axis is ± 1. If (xy) be the foot of the normal, we have then

$$\frac{dy}{dx} = \pm 1.$$

From the equation of the curve, however,

$$\tfrac{1}{2}\sqrt{\frac{x}{y}} \cdot \frac{dy}{dx} + \tfrac{1}{2}\sqrt{\frac{y}{x}} = 1;$$

that is, $$\frac{x}{2(a+x)} \cdot \frac{dy}{dx} + \tfrac{1}{2} \cdot \frac{a+x}{x} = 1.$$

Thus $$\frac{dy}{dx} = \frac{x^2 - a^2}{x^2}.$$

If $\frac{dy}{dx} = 1$, $x^2 - a^2 = x^2$, and x is infinite.

If $\frac{dy}{dx} = -1$, $x^2 - a^2 = -x^2$.

$$\therefore \quad x^2 = \frac{a^2}{2};$$

that is, $$x = \pm \frac{a}{\sqrt{2}}.$$

If $x = \frac{a}{\sqrt{2}}$, then $\sqrt{xy} = \frac{a(\sqrt{2}+1)}{\sqrt{2}}$.

$$\therefore \quad xy = \frac{a^2(3+2\sqrt{2})}{2}. \quad \therefore y = \frac{a(3+2\sqrt{2})}{\sqrt{2}}.$$

If $x = -\frac{a}{\sqrt{2}}$, $\sqrt{xy} = \frac{a}{\sqrt{2}}(\sqrt{2}-1)$.

$$\therefore \quad xy = \frac{a^2}{2}(3 - 2\sqrt{2}). \quad \therefore y = -\frac{a}{\sqrt{2}}(3 - 2\sqrt{2}).$$

The normal at (xy) is

$$(Y - y)\frac{dy}{dx} + (X - x) = 0;$$

that is, $$Y - y - (X - x) = 0;$$

that is, $$Y - X = y - x.$$

The equations of the corresponding normals in the above cases are then

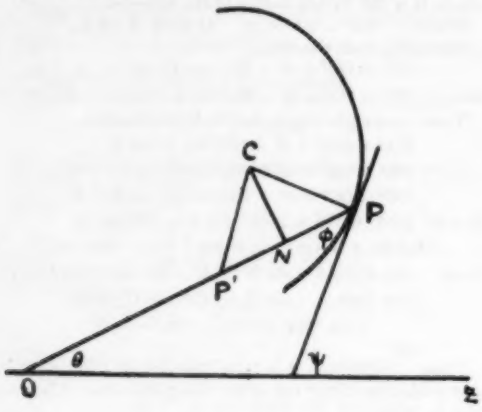
$$y - x = a(\sqrt{2} + 2) \text{ and } y - x = a(2 - \sqrt{2}).$$

Rollo.—Show that the chord of curvature through the pole of the equiangular spiral

$$r = ae^{m\theta}$$

is $2r$. (Edwards's *Dif. Calc.*)

Let C be the centre of curvature at P; thus $CP = \rho$ and join OP. If the circle of curvature meets OP again at P', PP' is the chord of curvature through the pole.



Draw CN perpendicular to OP, then by elementary reasoning

$$\begin{aligned} PP' &= 2PN \\ &= 2CP \cos CPN \\ &= 2CP \sin OPT \quad \text{[since CP is a normal]} \\ &= 2\rho \sin \phi. \end{aligned}$$

Now since $r = ae^{m\theta}$,

$$1 = mae^{m\theta} \cdot \frac{d\theta}{dr}.$$

$$\therefore \quad r = mae^{m\theta} \cdot \frac{rd\theta}{dr}.$$

$$\therefore \quad 1 = m\frac{rd\theta}{dr}.$$

But $$\tan\phi = \frac{rd\theta}{dr}.$$

$$\therefore \quad \tan\phi = \frac{1}{m}. = \text{constant}. \quad \therefore \frac{d\phi}{ds} = 0.$$

Again, $$\frac{1}{\rho} = \frac{d\psi}{ds} = \frac{d(\theta+\phi)}{ds} = \frac{d\theta}{ds} + \frac{d\phi}{ds}$$

$$= \frac{d\theta}{ds} = \frac{1}{r} \cdot \frac{rd\theta}{ds} = \frac{\sin\phi}{r}.$$

$$\therefore \quad \rho \sin\phi = r.$$

$$\therefore \quad PP' = 2r.$$

Maths.—Expand $f(x)$ in a series of sines of multiples of $\frac{\pi x}{c}$, from $x = 0$ to $x = c$, when $f(x) = x$ from $x = 0$ to $x = \frac{c}{2}$ and $f(x) = c - x$ from $x = \frac{c}{2}$ to $x = c$. Point out and illustrate by a diagram what the series represents for values of x outside the above limits. (Bd. of Education, Stage vii. 1909.)

We have for any value of x between 0 and c the formula found by Lagrange—

$$f(x) = \frac{2}{c}\sum_{1}^{\infty} \sin\frac{n\pi x}{c} \int_0^c \sin\frac{n\pi v}{c} \cdot f(v)\, dv.$$

In the present case we are told that when x lies between 0 and $\frac{c}{2}$, the value of $f(x)$ is x, and when x lies between $\frac{c}{2}$ and c, the value of $f(x)$ is $(c - x)$.

Thus the coefficient of $\frac{2}{c}\sin\frac{n\pi x}{c}$ is

$$\int_0^{\frac{c}{2}} v \sin\frac{n\pi v}{c}\, dv + \int_{\frac{c}{2}}^{c} (c - v)\sin\frac{n\pi v}{c}\, dv$$

$$= \left[\frac{c^2}{n^2\pi^2}\sin\frac{n\pi v}{c} - \frac{cv}{n\pi}\cos\frac{n\pi v}{c}\right]_0^{\frac{c}{2}}$$

$$+ \left[-\frac{c^2}{n^2\pi^2}\sin\frac{n\pi v}{c} - \frac{c}{n\pi}(c - v)\cos\frac{n\pi v}{c}\right]_{\frac{c}{2}}^{c}$$

$$= \frac{c^2}{n^2\pi^2}\sin\frac{n\pi}{2} - \frac{c^2}{2n\pi}\cos\frac{n\pi}{2} - \frac{c^2}{n^2\pi^2}\sin n\pi$$

$$+ \frac{c^2}{n^2\pi^2}\sin\frac{n\pi}{2} + \frac{c^2}{2n\pi}\cos\frac{n\pi}{2}$$

$$= \frac{2c^2}{n^2\pi^2}\sin\frac{n\pi}{2} - \frac{c^2}{n^2\pi^2}\sin n\pi.$$

Hence $$f(x) = \frac{4c}{\pi^2}\left\{\sin\frac{\pi x}{c} - \frac{1}{3^2}\sin\frac{3\pi x}{c} + \frac{1}{5^2}\sin\frac{5\pi x}{c} - \dots\right\}.$$

This expression gives then $f(x) = x$ if x lie between 0 and $\frac{c}{2}$, and $f(x) = c - x$ if x lies between $\frac{c}{2}$ and c, the limits being exclusive. At the limit $x = 0$, $f(x)$ is zero; when $x = c$, $f(x)$ is also zero.

If x is greater than c and positive, let $x = 2mc + x'$, then

$$\sin\frac{n\pi x}{c} = \sin\frac{n\pi}{c}(2mc + x') = \sin\left(2mn\pi + \frac{n\pi x'}{c}\right)$$

$$= \sin \frac{n\pi x'}{c},$$

so that the value of $f(x)$ is the same as if x' were put for x, and similarly for negative values—that is, the values of $f(x)$ are periodic, and repeat themselves between $x = 0$, $x = c$; $x = c$, $x = 2c$; $x = 2c$, $x = 3c$, . . . as $m = 1, 2, 3 \ldots$

If $y = f(x)$, then between $x = 0$ and $x = \frac{c}{2}$

$$y - x = 0,$$

and between $x = \frac{c}{2}$ and $x = c$

$$y = c - x, \text{ or } x + y = c.$$

The graph of the function, since $f(0) = 0$ and $f(c) = 0$, consists then of a series of right angles isosceles triangles, constructed on bases of length c, situated successively along the axis of x.

FAR AND NEAR.

INTERESTING ITEMS FROM VARIOUS SOURCES.

The Inarticulate.

THE inarticulateness of the child in the primary school is often commented upon. Many causes have contributed to this, not the least of which is the strict and repressive discipline which teachers have to adopt, in consequence of the unwieldy size of the classes so often entrusted to them. It is the only way in which any work can be got through, and no one regrets the necessity for its adoption more than the teachers themselves. They know that it drives the child, as it were, within himself, and has a deadening effect on the developing faculties. It is a fault of our school system which is practically beyond the power of the teachers to remedy. They can only protest, and call the attention of the public to the urgency for reform. One is glad to recognise that the Board of Education have at last initiated changes in the staffing regulations and the size of classes which, when carried into effect in the schools, will do something to make more effective the work of the teachers.—*Mr. A. Flavell at the N.U.T. Conference.*

"Art is Crystallised Delight."

WOULD it not be much better if school prizes were made things of beauty, and could be hung upon walls and given some display? Nowadays, the various processes of reproduction in black and white, in colour, in electrotype, make it possible to obtain the most beautiful things at absurdly small prices. If the primary schools of a small town were to give away as school prizes for a few years nothing but framed reproductions of great pictures, ancient and modern, electrotypes, casts of small objects of sculpture, even plaster casts in fine bas-relief, the gradual dissemination that would thus be accomplished in the houses of the working classes of things of beauty would, I think, be liable to have a civilising effect upon the whole rising generation.

The walls of the school, I think, may fitly be adorned with the great monuments of the world—the great buildings, the great pictures, and the great sculptures. I understand that it is permitted by the authorities to spend every year a small sum indeed, yet one that may be cumulatively great, on the purchase of works of art for the adornment of the walls of schools. —*Sir Martin Conway in the "Parents' Review."*

Too Many Stories.

STORIES of great men of all times and ages children must have; folklore and fairy tale hold, and will hold, their own as part of the child's birthright. If these are not told at home, they must be told at school, and this statement none of us question. But why Nature stories?—stories to help number lessons?—stories of little girls who lose their way in a wood and find a little house, in order to give children a reason for building a little house in their stick-laying lesson? In other words, why tell a story if it is not in itself or for itself good? If the aim of the lesson is that the child shall build a house, let him build the house and have done with it. If, again, the aim of the lesson is to get a child to look at, care, and continue to care for a snowdrop bulb, the teacher only confuses a pupil's idea and blunts his vision by talking of the bulb as the cradle, coverlet, or what not of the fairy flower. When the snowdrop becomes the heroine of some fairy romance just because and only because the class has had a lesson on snowdrops, a child's true and real interest in all living things is overlooked. The snowdrop is infinitely more wonderful and magical than the story, and the ordinary child will care for it for its own sake. No child worthy of the name is uninterested in the non-human people in the world—the birds, beasts, and flowers. Let him keep pets; let him watch birds, horses, dogs, etc.; let him grow flowers; give him facts as facts when he wants them, and no stories will be necessary to make the facts palatable. Then when the occasion for the real story arises—the story that is a joy in itself—tell it him, and so much the better if it is of one of his many friends.—*Nancy Catty, M.A., in "Child Life."*

Italian Lovers.

THE following story is taken from the *Cornhill Magazine*, and has reference to its famous editor, James Payn:—

"One day an unannounced caller who had managed to evade the porter downstairs opened Payn's door. His hair was long, and his clothes were shabby and untidy. He had a roll of papers in his hand. Payn, surmising a poet and an epic several thousand lines long, looked up. 'Well, sir?' 'I've brought you something about Sarcoma and Carcinoma.' 'We are overcrowded with poetry—couldn't accept another line, not if it were by Milton.' 'Poetry!' the caller flashed. 'Do you know anything about Sarcoma and Carcinoma?' 'Italian lovers, aren't they?' said Payn imperturbably. The caller retreated with a withering glance at the editor. Under the same roof as the *Cornhill* was the office of a medical and surgical journal, and it was this that the caller sought for the disposal of a treatise on those cancerous growths with the euphonious names, which, with a layman's ignorance, Payn ascribed to poetry."

The Arctic Teapot.

IN the *World's Work* we have the following description of a Peary tea-party at the North Pole, at which no Cook was present:—

"The making of tea in an Arctic temperature is a very simple matter—after you learn how. Each party was equipped with a 'cooker' (an alcohol stove made in two sections, which fitted into each other). The first thing is to get the 'water' for the tea. The snow is scraped off to a depth of from 12 inches to 18 inches, and a chunk of ice cut out and put into the top section, called the 'cooler.' Its bottom is perforated so that the water will trickle down as the ice melts. We do not use the granulated snow, because the ice melts more quickly. The water is not salty, for the simple reason that the surface ice is formed of snow which has melted and then frozen again.

"The boy puts six ounces of alcohol in the little stove and places it under the teapot. A piece of tissue-paper is twisted up into the form of a small wick and inserted in the alcohol. This is necessary, because the alcohol will not vaporise in that temperature. After the fire is started and the alcohol begins to vaporise the paper wick is taken out.

"A can of frozen condensed milk is chopped into two pieces, and one-half is placed in the teapot, and on top of it is put one and a half tablets of compressed tea. It takes about ten minutes for the ice to melt, and the tea is then soon made.

"As soon as the tea is ready half a pound of pemmican and eight hard ship's biscuits are given to each man. There is no variation in the bill of fare—pemmican and biscuits and tea make up a menu as unvarying as that of a boarding house."

Imaginative Education.

I LOOK upon imaginative education as a most important thing. Suppose a boy learns that William the Conqueror came in 1066. No date means anything to a child, because he does not know the character of the century. But if he learnt what particular effect the conquest of England by a more civilised power had, what a real horror of destruction meant, and yet that it meant the living of a new spirit; if he were told very simply about the Bayeaux tapestry, what the first Norman churches were like, how they differed from the Saxon churches, and so on, right through history, then according to the experience he would gain he would be able to understand more and more advanced forms of human expression. When you got your man of genius the soil would be ready, and he would not be, as he now is, inclined to be an outlaw, to be anti-social, impatient of control, but his genius could then be used really to inspire all men with an added enthusiasm for beauty and life.—*William Rothenstein in the "Morning Post."*

Babel.

IN a school in Tokio no less than eight thousand students are being taught English. The following description is taken from the *Japan Magazine*, and shows the enthusiasm for education which animates the "Scotland of the Far East," the land of deadly earnestness:—

"The government language school is a peculiarly attractive one. It is a veritable babel of languages, for in it are taught

English, French, German, Russian, Spanish, Italian, Chinese, Korean, Tamil, Hindustani, Malay, and Mongolian, and for each tongue a foreign teacher is engaged. In the professors' common room can be found a mixture of nationalities such as would seem to foreshadow the federation of the world. It is at any rate a Parliament of nations.

"Bearded Slavs, dapper Frenchmen, stolid Germans, voluble and gesticulating Italians—a constant source of wonder to the Japanese—dignified Spaniards, correct Englishmen, big Chinese with their peculiar Chinese pride, vacant-looking Koreans, a Mongolian Lama priest, revolutionary Hindus, a Malay Mohammedan full of proselytising fervour, and finally innumerable Japanese all rub shoulders together and get on somehow."

Having learnt English, what are they going to do with it? It is a comfort at least that they cannot learn Scotch!

"A Lad of Pairts."

I HAVE known exceptionally clever lads, who would have repaid the nation again and again if they had been taken in hand at the right moment, and had their abilities directed into proper channels, leave school and take up some menial form of occupation which the greatest blockhead that ever entered a school could have performed without the slightest mental effort. Only the other day, one of the brightest lads it has ever been my privilege to instruct, a lad with obvious business capabilities, left me at the age of fourteen to mind stamps and seal envelopes in the office of an oil and tallow merchant. The mother of this lad, a widow, told me how she regretted taking him away from school so early, but, having no husband, and being very poor, there was no help for it. Thus another sacrifice to the "god of might" was made. When it is remembered that these sacrifices are being made by the score every week of the year, the injustice to the innocent victims, and the fatal blow thus struck at the vitals of the democracy, rises before one with startling clearness.—*Cullwick Perrins in the "Socialist Review."*

The Plain Truth.

WE make no apology for quoting once again from the Report of the Poor Law Commissioners, which is at present inspiring our Editor to do great things in the practical direction, and which concludes with the following words:—

"'Land of Hope and Glory' is a popular and patriotic lyric sung each year with rapture by thousands of voices. The enthusiasm is partly evoked by the beauty of the idea itself, but more by the belief that Great Britain does, above other countries, merit this eulogium, and that the conditions in existence here are such that the fulfilment of hope and the achievement of glory are more open to the individual than in other and less favoured lands. To certain classes of the community, into whose moral and material condition it has been our duty to inquire, these words are a mockery and a falsehood. To many of them, possibly from their own failure and faults, there is in this life but little hope; and to many more 'glory,' or its realisation, is an unknown ideal. Our investigations prove the existence in our midst of a class whose condition and environment are a discredit and a peril to the whole community. Each and every section of society has a common duty to perform in combating this evil and contracting its area—a duty which can only be performed by united and untiring effort to convert useless and costly inefficients into self-sustaining and respectable members of the community. No country, however rich, can permanently hold its own in the race of international competition if hampered by an increasing load of this dead weight, or can successfully perform the *rôle* of sovereignty beyond the seas, if a portion of its own folk at home are sinking below the civilisation and aspirations of its subject races abroad."

A Revised Edition.

FRENCH school children of eleven to fourteen years use a grammar by Larive and Fleury. It has recently been revised in the interests of secularism, and the following shows one of the alterations:—

	REVISED EDITION (SINCE 1902).
"*IV. A proposition.*	"*IV. A proposition.*
"God is great.	"Paris is great.
"In *God is great, God* is the subject, *is* the verb, and *great* the attribute."	"In *Paris is great, Paris* is the subject, *is* the verb, and *great* the attribute."

"The substitution of Paris for the Deity is thoroughly characteristic. Possibly reverence profits by the change," says the *Review of Reviews*. We agree. There is more true religion in the substitution than in a host of anti-secularists.

The Feeding of School Children.

SOME of our readers may find the following extract of practical use in the matter of school feeding. It is taken from Mr. Blair's recent Report on the London County Council Schools:—

"A definite scheme for the conduct of inquiries was adopted on July 28, 1909. Under this scheme it was arranged that the head teacher should be empowered to place on the feeding list the names of all children deemed by him or her to be necessitous, and should send their names to the divisional superintendent, so that he might place on the case papers such official information as might be available. The scheme, then, provides that the parents should attend before the committee at a time convenient to themselves, and their statements are taken down upon the case paper. In the event of the parent being unable to attend before the committee, a visit is made to his home by an approved person to take down his statements. The case papers are then brought before the Children's Care (School) Committee, who decide whether the children's names shall be placed or shall remain on the feeding list, and whether any steps shall be taken to recover the cost. It is, however, the exception and not the rule for a non-necessitous child to be fed under the Council's scheme, and consequently the recovery of anything more than a comparatively small amount can hardly be hoped for, as in the event of the child who had been placed on the list being able to obtain meals at home his name would be at once removed from the 'necessitous' list. Only in rare instances is there any possibility of recovering from parents the cost of meals supplied to their children, and in those cases the means of the parents would probably be such that it would be difficult to prove them sufficient to warrant a magistrate in making an order for payment. Moreover, a further difficulty arises, inasmuch as it would be extremely difficult to secure the necessary evidence, and in only a few cases would a member of the Care Committee be willing to appear in court to supply evidence of means from information obtained as the result of his inquiries. The Care Committee may not reject any application or remove the name of any child from the list without giving the parent or guardian an opportunity of appealing against the decision."

"Double Fruits."

DOUBLE fruits may originate in either of two ways. Sometimes, when the fruits are very young, they may become accidentally pressed together so tightly that they crush together, as it were, and may then, as they become older, grow into one mass at this junction. This is a kind of grafting. This, however, is not the common origin of double structures. All fruits, like buds and the beginnings of leaves, originate in a mass of very soft cells which are easily affected by mechanical influences. If one of these soft young structures, which tends to grow as a unit, becomes injured at its very tip, which is the place of most active growth, the growth ceases at that point, but continues on both sides of it, and it continues to grow without making an effort to reunite the two parts. The injury may be caused by the bite of an insect, or by some other external cause; or it may be some one of the various influences we call "internal," although there is probably no real difference between external injuries and internal influences. In this way originate not only double fruits, but double leaves.—*From Nature and Science in April "St. Nicholas."*

An American Warning.

I THINK I am right in expressing the opinion that the coming nation in Europe to-day is Germany. If you think back a moment and recall that Germany is only forty years old, that she is one of the youngest nations in the great family of powerful nations, and that, when the German Empire was born, our own American Republic was almost one hundred years old, and then think for a moment what she has accomplished in these years. She has succeeded in waking up the nations to her ability, and has frightened England almost out of her senses. Have you ever noticed that, when you go in a store and look around, you find so many articles marked "Made in Germany"? If I am not mistaken, it is a sign that we are going to see more and more of this sign, "Made in Germany." And how has this tremendous advance taken place? England had the advantage and America had the advantage, and yet Germany is actually beating us both. It came because nowhere in Europe, nowhere in the civilised world, is education developed to such an extent among the middle and lower classes as it is in Germany. She has the best-equipped and far the best schools, the greatest universities, by far the most wonderful technical schools. Germany has gone about the work of preparation by paying the price, and the price is general intelligence.—*Dr. C. Hanford Henderson in "Sloyd Record."*

The Medicine of a Merry Heart.

"It is admirable pleasures and fery honest knaveries."—*Sir Hugh Evans.*

MISS ELLEN TERRY AS MISTRESS PAGE IN SIR HERBERT TREE'S REVIVAL OF "THE MERRY WIVES OF WINDSOR."

(*Copyright photo, "Daily Mirror" Studios.*)

GEORGE DU MAURIER wrote *Trilby* some twenty years ago, and when he wishes to convey the highest ideas of feminine grace, beauty, and charm, he compares his heroine to Miss Ellen Terry. Her height was that of the gifted actress—"and that is a charming height, I think." In describing Trilby's appearance before a London audience, he falls quite naturally into a somewhat similar comparison. "No such majestic or seductive apparition has ever been seen before or since on any stage or platform, not even Miss Ellen Terry as the priestess of Artemis in the late Laureate's play *The Cup*." To-day the power of the same wonderful player and her hold upon the affections of her audience are undiminished. It is a triumph over time which makes us all very young once more.

During the last few weeks, Sir Herbert Tree has entertained the town with a Shakespearian festival, and *The Merry Wives of Windsor* has figured largely in the programme. With Sir Herbert as Falstaff, Ellen Terry as Mrs. Page, and Lady Tree as Mrs. Ford, even the experienced playgoer expects great things—and is not disappointed.

The Merry Wives is not a play to be read in the study. It is a play to be acted. The gestures, the action, the fun, the laughter and rollicking gaiety set against a background of would-be villainy, so good-humoured that its very fang is drawn, make up nine-tenths of the comedy. We do not carry phrases home with us so much as impressions of colour, brightness, and laughter, and of humour so pervading and so powerful that it disarms villainy with a stronger and surer hand than that of austere virtue.

But it seems ridiculous to speak of villainy in connection with Sir John Falstaff. "Let me have men about me that are fat." Shakespeare himself supplies us with the key to the action. No man of the girth which Sir Herbert Tree compasses in this play ever embarked upon an enterprise which did not end in sack, or its later equivalent, and laughter fit for the Olympian gods.

One could imagine the cast of Shakespeare, which may be seen above one of the panels in His Majesty's, gazing with wonderment upon the setting of this play—upon the realistic representation of Windsor streets, the pretty costumes of the ladies, the handsome equipment of the gentlemen; and, above all, upon the woodland scene near the end of the play, with its tripping fairies, its delicately blended colours, and its studied effect. The actor-manager of the Globe had to rely upon other aids than these. This may be one reason why we have no Shakespeare in our enlightened day.

The basket scene in this play and with these players is already famous; and some day, if all is well, I am going to boast to my degenerate grandchildren that I saw Sir Herbert Tree and Ellen Terry in this masterpiece. It is impossible for any verbal descriptive effort to convey an adequate impression of the qualities of the acting. It is broad, it is farcical, it is the very antithesis to Sheridan; but it is human, with the humanity of true genius, and the mirth which it raises is of the healing character which is a sweet refreshment to both body and mind. Perhaps I ought to apologise for unseemly mirth at the sight of two women trying to lift a fat man into a clothes basket; but for the life of me I cannot do it, not even to the Editor of an educational magazine.

Another scene which gives great scope for artistic interpretation, of which full advantage is taken, is the First in the Second Act, in which the two ladies compare the letters which they have received from Sir John. The plain text gives little idea of the manner in which Ellen Terry conveys to her gossip that both have received what the modern business man would call a "form letter."

> I warrant he hath a thousand of these letters, writ with blank space for different names—sure, more—and these are of the second edition: he will print them, out of doubt.

Then, again, in that "Field near Frogmore," we have an excellent presentation of the little would-be choleric Welsh parson who must defend his honour, according to custom, at the point of the sword.

> 'Pless my soul, how full of cholers I am, and trempling of mind!—I shall be glad if he have deceived me.—How melancholies I am! 'Pless my soul! [*Sings*
>
> "To shallow rivers, to whose falls
> Melodious birds sing madrigals;
> There will we make our peds of roses,
> And a thousand vagrom posies.
> To shallow—
>
> Mercy on me! I have a great dispositions to cry.

That cracked vocal performance, designed to summon up martial courage, is better worth hearing than some of the finest efforts at Covent Garden.

Fortunately, this is not a play which finds a place in educational schemes of English literature. Our readers who have not yet seen it can therefore look forward to enjoying it to the full. Sir Herbert Tree's presentation will reveal in the comedy many things which would possibly be fresh even to Shakespeare; but that is not a new thing among commentators and interpreters.

"QUEENS ARE THEY ALL IN NEBRASKA."

BY "OBSERVER."

HERE'S a hand to our fellow-workers in the State of Nebraska, and especially to Mr. E. C. Bishop, Superintendent of the Department of Public Instruction, who sends us a budget of literature fully describing the manner in which the practical education of girls is conducted in the schools and colleges under his jurisdiction. If I required a wife, I think I should go over and make my selection from the girls who have taken a home-work course in cookery under the guidance of Mr. Bishop and his colleagues. The aim and execution of the work would delight Miss Cleghorn, who boldly demands that our schools should turn out domesticated girls capable of becoming womanly women. James Whitcomb Riley embodies the ideal in his homely lines, which are quoted in one of these Nebraska bulletins:—

> "Soon as she turned in and got
> Supper fer us—smokin' hot—
> And the 'dishes' all was through.
> Sich a supper! W'y I set
> There and et, and et, and et!
> Jes et on tel Jonas he
> Pushed his chair back, laughed, and says,
> 'I could walk his log!' and we
> All laughed then, tel 'Viry she
> Lit the lamp—and I give in!
> Riz and kissed her: 'Heaven bless
> You!' says I—'you're home ag'in—
> Same old dimple in your chin,
> Same white apern,' I—says ee,
> 'Same sweet girl, and good to see
> As your mother ust to be,—
> And I got you home ag'in—
> Home ag'in with me!'"

The course of study in domestic science includes lessons on the scientific basis of dietetics (this is a severe phrase after James Whitcomb Riley, but there is no real harm in it), closely combined with the practical

work of following the recipe, and even of interviewing the local butcher, who, it is asserted, "is very glad to give a meat demonstration if requested." There are also lessons on canning and preserving, on invalid cookery and home nursing, on basket lunches, and household pests. The last-named are not men, nor yet general servants, but insects.

There is, in a sense, nothing distinctly novel in this work, but the practical, cheery note which is struck and maintained in these illustrated bulletins is somehow lacking in our school courses in domestic science. I think this is because we on this side of the herring-pond are too sensitive to criticism. We worship the casual, and the rule of thumb is our fetish. We are afraid of method and order, and we seem to think that science is somehow a thing which must be kept out of the home. In fact, many of us still class it with atheism. We have yet to grasp the idea that the high school girl, not in spite of, but because of, her training can become the

"Same sweet girl, and good to see,
As her mother used to be."

Another of these Nebraska bulletins is entitled, "Something about Sewing," and tells how to make, among other useful things, a "University of Nebraska Domestic Science Apron." Fancy a University of Oxford ditto! It is made of gingham, and requires neither buttons nor pins. That it can look quite as charming as a Paquin or a Worth creation is proved by our illustration.

I shall be glad to learn more of the work done in Nebraska, where they seem to have taken a firm hold on commonsense views of education, and to be engaged in putting them into practice in a manner which we should do well to imitate. But we talk and talk and talk!

A SCHEME OF CORRELATED HISTORY AND LITERATURE.

SCHEME FOR MAY—RICHARD I. AND JOHN.

BY MABEL A. BROWN.

GRADE I.	GRADE II.	GRADE III.
History *— Richard the Lion Heart. The story of the Crusades. The story of Prince Arthur. John as prince and king. How we got Magna Charta.	As for Grade I. Trace also the growth of the people's power during these reigns.	Richard I. (*a*) as king; (*b*) as warrior. The Crusades and crusading heroes. The reign of John. Magna Charta.
Literature— (*To be told to the Children.*) The Fearful Page, from *Boys and Girls of Other Days, I.* Richard and Saladin, from *The Talisman.* Stories of Robin Hood.	(*To be read by the Children.*) *Tales of the Middle Ages.* Horace Marshall, 1s. Story of Prince Arthur, from *Stirring and True.* Collins, 6d.	(*To be read by the Children.*) Robin Hood. E. J. Arnold, 4d. *On the Welsh Marches. Christian and Moslem.* Blackie, 4d. *Richard the Lion Heart.* Nelson, 3d.
Poetry for Recitation— Selected verses from "Robin Hood," by Keats.	John and Magna Charta; Robin Hood. *Ballads of British History.* Nelson, 3d.	Crusaders' War Song. Richard I. at the Bier of his Father. *Ballads of British History.*

* The stories of Stephen Langton, Hubert de Burgh, and Simon de Montfort should be taken during May and June in connection with the idea of the rise of the people.—(Grades II. and III.)

NOTES ON LITERATURE.

Many fine poems for reading or reciting to the children may be found in the two volumes of *The Call of the Homeland*, published by Messrs. Blackie. "Allan-a-Dale," "Sherwood," "The Song of the Bow," and many others may be found suitable for using in connection with this month's work.

Shakespeare's *King John* should be brought to the notice of the elder children. Passages selected by the teacher should be read aloud by individual children, and some dramatisation should be encouraged. There is an excellent dramatised version of the meeting of Richard the First and Saladin in *Dramatic Scenes from History*, published by Edward Arnold, London. Scott's *Talisman* and *The Betrothed* will give teachers valuable insight into the state of England during this time, and also vivid pictures of the Crusades and crusading heroes. Even quite young children will enjoy the reading aloud of selected passages from the enchanted pages of Scott. Suitable ones are the meeting of Richard and Saladin, Richard's interview with the mysterious physician, Sir Kenneth of Scotland's desertion of his post, and the detection of the traitor by the noble hound Roswal.

NOTES ON HISTORY.

The Rise of the People.—Though the chief interest of this historical period naturally centres round the heroic figure of Cœur de Lion and the stirring times of the Crusades, yet the movement of greatest importance in the story of England is the gradual birth and growth of the idea of the power and the rights of the people. This point should always be kept before the minds of our older scholars. The gradual development of the principle of the representation of the people and their needs in the councils of the nation is an idea of the greatest importance for the future citizens of England. The utmost care should be taken to present to them a justly-balanced view, and to give them a real love and respect for the ancient constitution of the English nation. This can be done in the best way by helping them to trace from its earliest beginning the building up of our present system of government, foreshadowed, so to speak, in the Witanagemot of our Saxon forefathers, and gradually growing, deepening, and widening from that day onward. The figures of Cæsar, Agricola, Egbert, Alfred, Dunstan, Anselm, Henry the Second, etc., in the capacity of law-makers for the good of the people have already been seen. Now come such men as Stephen Langton, Hubert de Burgh, and Simon de Montfort, each in his turn striking a fresh blow against tyranny and in the interests of the English people.

Richard the First as King.—As soon as Richard succeeded to the throne of his father, with his mind full of the Crusades, he gave himself up to planning the expedition, and to providing for the safety of England during his absence. All was peace at home, for men seemed to think only of the danger of the Holy Land. But money was needed, and in order to raise this money Richard gave up the sovereignty of many parts of his dominion. Thus were the acquisitions made by Henry the Second doomed to be easily and lightly lost at the hands of his son Richard, and to a greater extent still during the reign of John. To the Scottish king he gave back the right of homage for a sum of money; he sold sheriffdoms and earldoms (Hugh de Quiset, Bishop of

Durham, by this means became supreme, under the king, in the northern shires); he filled up vacant bishoprics, changed all the sheriffs, and at the head of the government he placed a man of his own, Longchamp, Bishop of Ely. He gave to his brother John vast possessions in England and abroad, hoping by this means to buy his gratitude; and he promised the See of York to his half-brother Geoffrey, while forbidding him to land in England for three years. Richard now thought that he had left everything settled and in good order, but he did not leave his country entirely at peace. The first months of his reign were marked by fierce attacks on the Jews, whom the kings had protected because they used them as bankers, money lenders, and tax collectors. The Crusades made matters worse, and the Jews were indeed in hard case from this time until their expulsion by Edward the First.

Richard sailed in April 1190, and England saw him no more for four years, during which time the country was in a most unsettled state. John and Geoffrey (who had returned in spite of the king's prohibition) took the opportunity of Richard's absence to stir up strife. The great Bishop of Durham was a formidable rival to Longchamp, and the latter alienated both barons and Church by his arrogance.

The treacherous John won over the Londoners by promising them privileges, and became recognised as regent. He joined himself with the barons, and dismissed Longchamp, the king's minister. When Richard returned in 1194, after the English people had paid his ransom, he was welcomed as the national hero. He at once proclaimed the lands of John and his following of barons forfeit for treason; levied taxes, sold offices, fined all who withstood him; and, after two months stay in his own land, he left England with a fresh sum of money, never to return. He was generous and forgiving to such as asked for pardon, and bravery was certain of recognition from him; but his whole interests were bound up in the Crusades, and his country was quite of secondary consideration and importance.

Richard the First as Warrior.—Cœur de Lion was undoubtedly one of the greatest military geniuses of his time. He could plan and carry out his schemes with consummate success. The character of his genius was such as to make him conspicuous even among great military leaders, and he was recognised, though grudgingly, by some lesser natures as a born leader and head of the crusading expeditions of his reign. The story of Richard as crusader is best told in *The Talisman*, and an excellent idea of the warring elements in his nature may be gained from that book. His strong indomitable will, his princely bearing and personal appearance, his valour, his chivalry, his supremacy among rulers of other nations, all endeared him as a great national hero to the hearts of the English people, and in his triumphs they largely forgot their own woes. His passionate temper, his fickle and impulsive temperament, his swift, relentless judgments, his overbearing nature, were all forgiven and forgotten, and when ransom was needed the English people gave ungrudgingly. At his death, at the castle of Chaluz in 1199, his brother John succeeded him.

The Reign of John.—If Richard was a careless king, John was a wicked one—strong for evil, weak for good. He had none of his father's wisdom or his brother's bravery. Without respect for his own word, his promises were of no value. His solemn coronation oaths he disregarded lightly. His passions were unrestrained, and he was both mean and cruel; men hated and despised him. A contemporary writer said of him, "Hell itself is defiled by the presence of John." Though the beginning of his reign was peaceful, within a year all was changed. He succeeded to a vast inheritance, but long before the end of his reign he lost all his French lands but Aquitaine, and all the Norman duchy but the Channel Islands, and this through sheer sloth and incapacity. With the loss of Normandy, John was now left to face his own people in his own land.

Since the time of the Conquest the kings of England had always their continental possessions to visit, but now John was forced to remain and face the consequences of his own rashness and misgovernment, just at the time when the English people were beginning to realise their unity and strength, and their right to good laws and a good king. John's quarrel with the Pope against the election of Stephen Langton to the see of Canterbury won him the alienation of the Church. He was excommunicated, and the land laid under an interdict, while Philip of France was commissioned by the Pope to depose him. John was first defiant, then paralysed by terror. He knew he could not rely upon the barons, the Church, or the people; he had wronged all three too deeply. His only course was to submit, and his submission was abject.

Stephen Langton came to England and released the king from his excommunication; but nothing could restore confidence in the weak, perfidious, tyrannical king. From this time events led slowly but surely up to the granting of Magna Charta, the great charter of the liberties of England. But the very granting of it seemed the opening for fresh strife. John never intended to keep it, and applied to the Pope, who declared the Charter illegal and excommunicated the barons. Now both parties prepared for war. The barons asked Louis of France, who had married John's niece, to take the English crown. Accordingly he came over, and in three months he had won over a large part of the country. In the midst of all this tumult King John died—some said from poison. It is said that no man regretted him; certain it is, that a wave of general thanksgiving and relief passed over the land at the news of his death.

Note.—If time permits this month, the stories of Stephen Langton, Hubert de Burgh, and Simon de Montfort may be started. *History Teaching by Biography, I.* (Charles and Dible), gives all three.

TUTORIAL COLUMN FOR THE ELEMENTARY CERTIFICATE OF THE NATIONAL FROEBEL UNION.

INTRODUCTORY.

THE following questions have been set in previous years at the National Froebel Union Examinations. Suggestions for work in the various subjects are also given for the help and guidance of students.

1. *Knowledge of Child Nature.*

(1.) What amount of sleep is required by children between the ages of three and seven years? Under what conditions should it take place?

(2.) Give a practical scheme for the distribution of the time (day and night) of a healthy, normal child of six years old, stating reasons for your answer.

(3.) To what factors in a child's surroundings would you attach most importance on account of their influence on character and health?

Hints and Suggestions.—Students are advised to read and study very carefully the little book entitled *Some Characteristics and Requirements of Childhood*, by Alice Ravenhill (E. J. Arnold, 9d. net). A very interesting article on sleep is given in the last issue of *Child Life*.

2. *Practice of Education in Kindergarten and Transition Classes.*

(1.) What, in your experience, are the games which young children most enjoy? Describe a suitable game for little children, and say how far you think the teacher or parent is justified in interfering with the natural carrying out of their own ideas in play.

(2.) What course would you pursue in dealing with (*a*) an intelligent child in the home who tries to teach himself to read, and (*b*) a large class of children learning to read in school?

Hints and Suggestions.—Students are advised to read an excellent little book recently published by Ginn and Co., entitled *Education by Plays and Games*, by G. S. Johnson. They should also read in Froebel's *Pedagogics of the Kindergarten* the chapters dealing with "Movement Plays" and "How Lina learned to Read and Write."

3. *Class Teaching.*

General Hints and Suggestions.—Students intending to take the examination in July are advised to begin planning their courses of lessons without delay. Spring is a good time for all kinds of Nature lessons—plants, animals, or natural phenomena—and it is a good plan to take plenty of these lessons with the children, and to allow ample opportunity for direct observation. The wise teacher will have had the spring flowers—snowdrop, crocus, daffodil, hyacinth, narcissus, etc.—growing in the school, and will have studied the life of the plant from the beginning. She will also have made records of their growth—for example, simple drawings on brown paper with coloured chalks. These drawings will be useful for illustrations should the student decide on a flower for her Nature lesson.

Animals also should be studied alive, and simple drawings made of their various stages of growth—for example, tadpoles, goldfish, minnows, sticklebacks, water snails, and beetles, etc., fresh-water mussels, snails, caterpillars, earthworms, silkworms, spiders, doves, rabbits, tortoise, hedgehog, cat, dog.

The keeping of pets in school presents many difficulties, and it is not advisable to try to keep them all the year round, but to keep them for a short time during the spring and summer, and to take most of these lessons at that time.

The choice of a suitable *game* seems to be the most difficult, and students are recommended to choose the game first, and then a story and Nature lesson in connection with it.

SUNDIAL.

The following games from the *Mother Play Book* are suitable to the season, short, and full of action—The Garden, The Snail, The Trees, Windmill, The Fishes, The Pigeon House, Little Bird, you are welcome.

Students selecting *stories* in connection with Nature lessons should go to a good literary source—for example, Hans Andersen: "The Fir Tree," "Ugly Duckling," "Ole Luk Oie, or the Dustman," "Thumbelina," "Five Peas in a Pod." Rudyard Kipling: *Just so Stories, Jungle Book.* Ernest Thompson-Seton: *Raggylug, and other Stories.* Flora J. Cooke: *Nature Myths and Stories.* Carl Ewald: *Queen Bee, and other Nature Stories.*

Excellent suggestions for teaching and drawing up notes of lessons are given in Miss Dodd's books, entitled *Nature Study and Fairy Tales*, Parts I. and II (Nelson and Sons). Students are however, warned not to take these for examination purposes, but to make an independent selection based on these lines.

4. *Blackboard Drawing.*

(1.) *Memory Drawing* :—

(i.) *Plants.* — Wallflower, radishes, horse-chestnut, leaves, or grapes; primroses, ear of wheat, sycamore leaves, or plums; daffodils, beans, laurel leaves, or cherries.

(ii.) *Animals.* — Dog, snail, herring, or duck; sheep, frog, oysters, or robin; mouse, tortoise, stickleback, or canary.

(iii.) *Objects.*—Pail or book, bell or rake, bottle or boot.

(2.) *Model Drawing.* — Draw from models placed before you a watering-pot standing on a box. (Eye-level must be indicated in the sketch.)

(3.) *From Nature.*—Make an enlarged sketch of the spray (thistle or knap-weed) with which you are provided.

(4.) *Free Illustration.* — Sketch *one* illustration which would be useful in a lesson on modes of travelling, or *one* for a story lesson on "The Little Match Girl."

(5.) Make an enlarged drawing of the small sketch given above.

5. *Nature Knowledge.*

(1.) *Plant Life* :—

A (i.) Describe the flowers and fruit of any two of the following, indicating the method of pollination, and the way in which the fruits or seeds are distributed—elm, hazel, lime, pine.

(ii.) Name two examples of a perennial plant and two examples of an annual, and use these examples to illustrate the chief differences between annuals and perennials.

B (i.) How would you propose to make real to little children the fact that the sun's position in the sky varies according to the seasons? Explain carefully.

(ii.) Make a list of experiments you would perform with children if dealing with the subject of shadows. What facts might be recorded as the result of your experiments?

(2.) *Animal Life* :—

(i.) Give a full account of the way in which you would study newts with a class of children of about eight years, mentioning any arrangements you would make to facilitate this study. Give in detail the facts which would be recorded by the class during the lesson on newts.

(ii.) What are the characteristics of reptiles? Describe and sketch the common grass snake. Explain its mode of locomotion, and point out any adaptations of structure thereto.

(iii.) Give as full an account as you can, in the case of *two* of the following—sparrows or any other perching birds, hens, rabbits, bees—of how the parents care for and instruct their young.

Hints and Suggestions.—Students are advised to read as much literature dealing with Nature as they can. (See suggestions under Class Teaching.) For practical work the books by Professor Miall are very helpful—for example, *Object Lessons from Nature*, Parts I. and II. (Cassell and Co.); *House, Garden, and Field* (Edward Arnold).

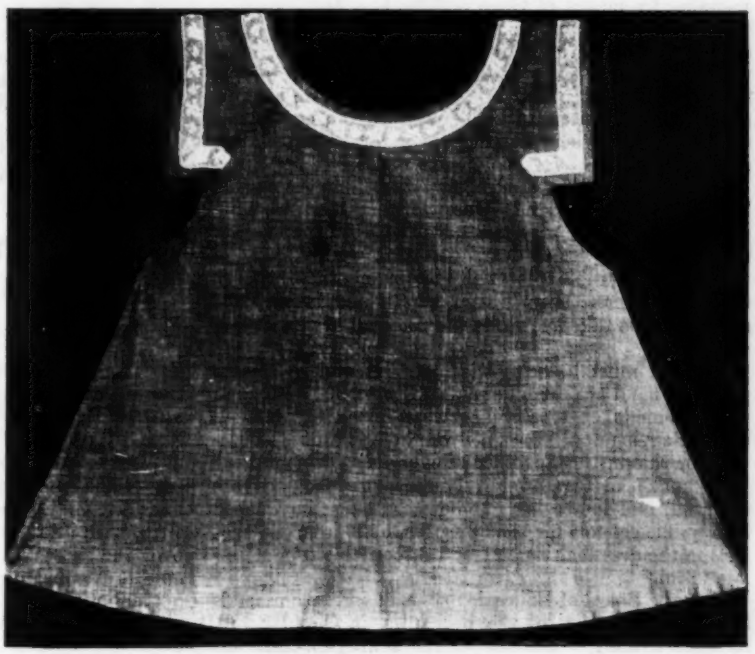
6. *Educational Handwork.*

(1.) Describe the kind of sewing suitable for children of six, and show how it might be connected with other parts of their work.

(2.) At what stage would you let children learn to sew? What materials would you use with beginners? What precautions derived from your knowledge of the degree of physical development attained by children in a kindergarten would you observe in making arrangements for this occupation?

(3.) Give an outline of six lessons in sewing for children of six years of age.

(4.) In what way is kindergarten sewing more suited to little children than ordinary sewing? How may the two be connected?



CHILD'S PRINCESS PINAFORE.

(*See page 698.*)

Our Needlework Column.

BY J. A. FLEMING, AUTHORESS OF "COMMON-SENSE NEEDLEWORK."

THE USE OF THE SEWING-MACHINE IN SCHOOL.

(*Continued from page 609.*)

IT is too late in the day to say that sewing-machines have "come to stay" in elementary schools; but they *are* destined, we believe, to play an even more important part in the future than they have done before.

The results accruing from the needlework instruction of the past have been so meagre that many teachers have been led to exclaim, "What good is it all?"

If one may judge by the few home-made garments brought to school on "mending day," it is no wonder that the standard of girls' work is low, with such coarse, clumsily put together articles constantly before their eyes.

The ready-made clothing trade has grown rapidly, and immense numbers of girls and women are employed in huge factories in many of our densely populated areas. The materials of which these garments are composed are of the very flimsiest description, as may be expected from their cheapness. The margin of profit being small, no fasteners are affixed, and pins take their place; thereby adding their quota, in the shape of daily increasing holes, to the rapid destruction of the clothing. Consequently, these things are not *worth* mending. The cost price is so little (less in many cases than a medium quality of material would be) that they are worn by a large proportion of the working population till they will hold together no longer, when they are relegated to the rag-bag. The teaching of mending by means of these articles is a heartbreaking task, for the texture is so rotten that often it tears even with fixing, and the colours are so ephemeral that after one or two visits to the wash-tub it is almost impossible to guess their original hue. Yet no shadow of disapprobation must be allowed to flit across the teacher's face as she handles them, or next mending day nothing will be forthcoming to mend.

What must be said of the "sweating" that is caused by these cheap goods? One wonders that working people do not say, "We *will* not use these cheap things that cost our sisters so dear." If each working woman would buy durable material instead of these trashy things, and make them up for herself and family, one step would be taken towards the removal of this crying abuse.

While it must be acknowledged that undergarments made by hand are more dainty and softer in finish than machine-made ones, still a sewing-machine, with all its time-saving appliances, is invaluable to a busy housewife for the putting together of everyday garments.

To make dresses effectively, sewing-machines are essential, and increasing numbers are being introduced into public schools for that purpose, as it is found that girls in the dressmaking classes are soon able to manipulate them.

Now the Board of Education steps in and recommends a wider application of the principles, in Circular 730, in these words: "The use of the sewing-machine for long seams and hems prevents needless repetition in the work of older girls, and gives time for more useful work in the shape of additional garments."

This clause will revolutionise the teaching of needlework to such an extent as cannot be realised for some time to come. It will save hours of teachers' labour, and reduce the drudgery of children's work. In this matter we are a little behind the times, for, four years ago, in an elementary school in Bergen, *half a dozen* machines were seen at work. The benefits derived from their use were exemplified in the appearance of the children, who were exceedingly neat and tidy. Their garments, we were informed, had been patched during school hours by the aid of the sewing-machines. It will be a long time, we fear, before so many are supplied to *our* girls' schools. One machine in a large school would be of very little use, as presumably all the classes would require it at the same time. A skilled machinist would be kept hard at work stitching for fifty or sixty girls within the limits of a needlework lesson. Besides, if the machine is to be of real benefit, *each* girl must take a share in using it. Obviously, it would have little value if either the teacher or the elder girls were to do the work for the rest of the class.

The modern machine has such marvellous possibilities that it will be of immense value to any girl to be taught its use, whatever her position in after life may be.

Technical instruction of all kinds has for its ultimate object the turning out of boys and girls capable of using both brain and hands to *some* practical purpose, not, as some people erroneously suppose, to fit them for *any trade*.

The introduction of the sewing-machine into school is not intended to be the means of training girls to become dressmakers. School is a preparation for *life*, and most girls pass their lives in prosecuting home interests, in one way or other, as mother or daughter, wife or sister, mistress or maid. Therefore, anything that tends to prepare them for home duties is not only making them capable of playing well their part in life, but it is also adding a little to the sum total of the well-being of the world in general.

(*To be continued.*)

THE REPAIRING OF GARMENTS IN GIRLS' SCHOOLS.

(*Continued from page 608.*)

To Repair a Longitudinal Slit in Print (Fig. 1).—Lay the garment wrong side up, placing the edges of the slit as close together as they will lie. Take an inch-wide strip of print a little longer than the slit. Make a narrow fold on the *right* side all round it except on one of the short ends. Press and stroke the fold quite flat (Fig. 2). Make a crease down the middle. Lay the strip, with its right side down, so that the crease comes over the slit. Pin the strip to the garment at the top and at the bottom so that the extra length is at the bottom of the slit. Tack it round near the edge. Hem neatly with cotton or silk the colour of the print (Fig. 3). Take the tacking threads out. Turn the work over. With the tip end of the needle turn in the raw edges on the right side, and hem neatly. Take out the tackings, and press flat (Fig. 4).

To Repair the Torn Vent of a Flannel Petticoat (Fig. 1).—Unpick enough of the herring-boning on the broad hem to allow the tear to lie flat. Turn the garment right side out. Cut off a strip of galloon, flannel, or

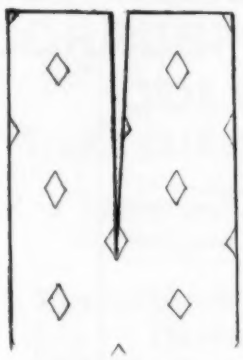


FIG. 1.—WRONG SIDE OF PRINT, SHOWING SLIT.

FIG. 2.—STRIP OF PRINT.

tape three-quarters or one inch longer than the slit. Lay a fold at the top and bottom of galloon or tape, but leave the raw edge if flannel is used. Place the galloon under the slit on the *wrong* side of the petticoat, with the folds facing the garment. See that one of the raw edges of the flannel comes quite down the middle of the galloon.

Pin it in in such a position that the top of the galloon will just cover the slit, but that the bottom extends half an inch *below* it. Tack it firmly. Place the other raw edge of the slit quite close to the first, and tack *it* also in place.

Work a row of herring-bone stitches on the right side to enclose both raw edges of the flannel, taking care that the upper and lower half of the stitch comes

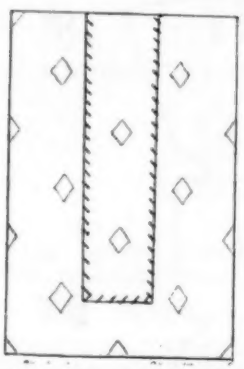


FIG. 3.—STRIP LAID OVER THE SLIT (WRONG SIDE).

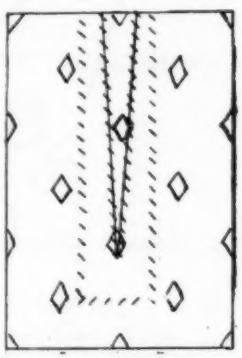


FIG. 4.—RIGHT SIDE.

above and below the slit, as in Fig. 2, which, for convenience, also shows the hemming stitches. See that the stitches go quite through both materials.

Turn the garment inside out. Hem all round the galloon (Fig. 3). If flannel is used, herring-bone all round it. Lay the pleat as it was originally (Fig. 4). Finish off with two rows of back-stitching on the right side.

Torn Vents in Calico Garments.—Children who have not learned to patch may be allowed to repair torn vents by means of broad tape. The same plan is

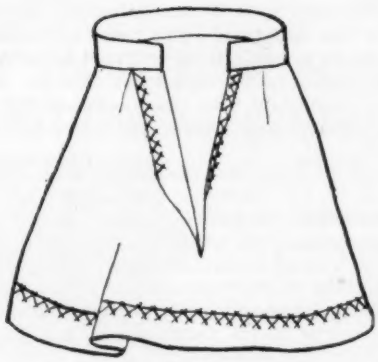


FIG. 1.

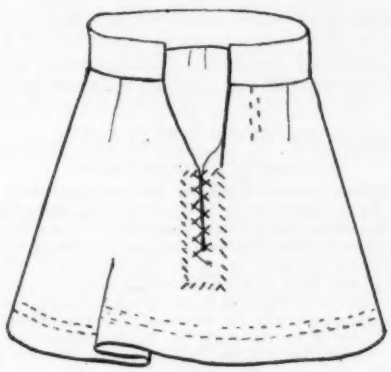


FIG. 2.

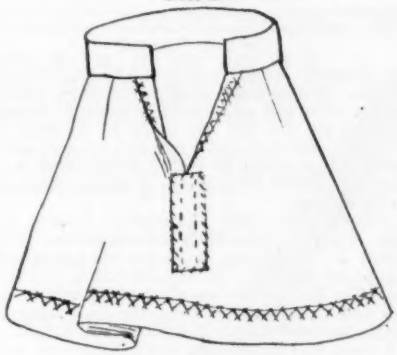


FIG. 3

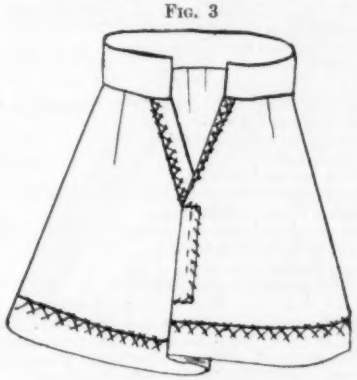


FIG. 4.
TORN VENT IN FLANNEL PETTICOAT.

adopted as is used on the flannel garment. The tacking stitches in this case must be as near the outside edge of the tape as possible, to allow room to turn in the edge of the calico on the right side. The raw edges of the slit are turned in with the tip end of the needle. Hem neatly on the right side, as in the case of the print slit (Fig. 4).

By means of these two methods, girls in the lower classes will be able to repair slits in the openings of flannel, flannelette, or calico chemises, drawers, skirts, night-dresses, and shirts, as well as those under the arms of pinafores, whether made of cotton or woollen materials. When repairing outdoor garments, the herring-boning should be done with silk or fine cotton, matching the prevailing colour of the material. In this way, even young children will be able to keep their garments neat and tidy.

The suggested methods may not always be the most perfect ones, but they are quite practical for such as have not acquired the power of doing more advanced work. It is more difficult devising plans to be adopted by young children, than by those who have learnt the art of patching and darning in all its forms.

Answers to Correspondents.

Small School.—As you are the *first* correspondent in this column, I have endeavoured to do what may not always be possible—that is, to reply in the next issue. I think you will find the small princess pinafore what you require as a "simple garment suitable for making up by the children in Standards II. and III.," and shall be glad to have an expression of opinion from you as to the result. It is exceedingly simple, yet smart, for there is no reason why the two qualifications should not go together. There is no necessity to confine simplicity to the "cottage" variety of pinafore. The cutting-out will make a good lesson for Standards IV. and V.

CHILD'S PRINCESS PINAFORE. (*See p. 695.*)

(Age 2 to 4 years.)

Suitable Materials.—Zephyr, muslin, holland linen, turkey-red twill, etc. The original is of pink zephyr, trimmed with lace insertion. One and a half yards of material 36 inches wide will be needed for one, but two could be cut from 2¼ yards. Two and a half yards of insertion will trim the neck and sleeves; 2 yards extra will go round the bottom of the garment.

To Make the Pattern by Folding.—Take an oblong of paper 24 inches by 14 inches.

N.B.—Press all the folds thoroughly. Double the paper lengthwise. Double it again in the same direction. That makes four divisions across the top. Open out the paper, and double it in the opposite direction. It requires folding into three parts this time. The best results are obtained by folding the paper backwards and forwards. Open out the paper, and draw the pattern as in the diagram. Mark the corners A, B, C, D. (Fig. 1.)

From A mark E 1¼ divisions in.
From A mark F 1¼ divisions in and 1¾ divisions down.
Connect E and F by a straight line.
From B dot a diagonal across the division.
From B mark G ¼ of a division in.
From B mark H ¼ of a division down.
Draw a semicircle from G to H, passing through I, which is ¼ of the diagonal from B.
From C mark J ¼ of a division up.
From D mark K 1 division in.
From J draw a curved line to K.
From C mark L 3¾ divisions up, and 1¼ divisions in.
Connect J and L by a straight line.
From A mark M 1¾ divisions down, and 2¼ divisions in.
Connect F and M by a straight line.
Draw a curved line from L to M.
A quarter of the pattern is now complete.

To Cut out the Material.—Fig. 2 shows the pattern laid out on single material, and it can be cut out that way. The more general method is to fold the material weft way, and lay the pattern on, placing the shoulders to the fold. The dotted lines at each side of the neck curve indicate the shoulders.

To Make up the Garment.—As it will, in all probability, be made up in thin materials, *special care* must be taken not to stretch the edges of the work when fixing or sewing, as most of them are on the cross. Join the sides by either a run-and-fell seam, a double French seam, or by a counter hem. Face the armholes and neck with crossway strips of material, which may be cut parallel with the sides J L in Fig. 1. They will not be "true" bias, but they will be sufficiently so to answer that

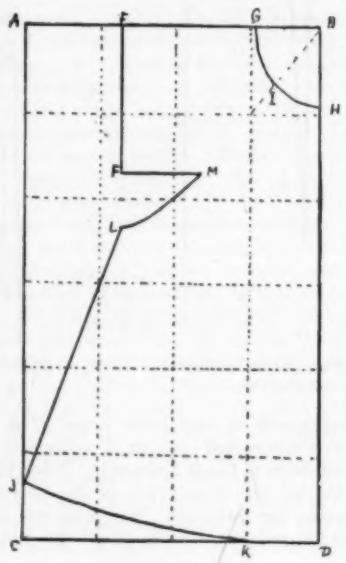


Fig. 1.

purpose. Place the raw edges of the cross strip to the raw edge of the garment on the right side. Tack first, and run afterwards. It is taken for granted that children in Standards II. and III. have learnt the running stitch. Take sufficiently deep hold to prevent the raw edges fraying. Make a tiny pleat and a double backstitch at the corners of the armhole, and across the side seam to allow the false hem to fit well.

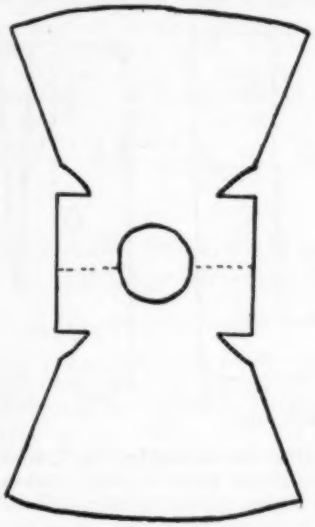


Fig. 2.

Turn the strip over to the wrong side, lay a narrow fold on the free edge, and tack the hem down. Be careful to see that the running stitches come quite to the edge with no fold projecting. It is a good plan to insert the point of the needle into the running stitches occasionally, to draw them to the edge.

Make a ½-inch hem round the sleeves. Affix the false hem to neck by running, with an occasional backstitch, taking note

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of the points to which reference has already been made. Make a ½-inch hem round the bottom of the pinafore.

Tack the insertion an even distance from the edge, allowing a little fullness round the neck. Make a neat join on the shoulders. Run the insertion top and bottom. In turning the corners of the sleeves mitre the lace nicely.

The pinafore looks very attractive when made of plain coloured material if it be feather-stitched coarsely with thick cotton or silk of some contrasting colour.

The making of the garment may be still more simplified by turning the edges of the sleeves, armholes, and neck over on to the right side, and tacking over them a firm, self-edged insertion as a trimming. This can be run both top and bottom, or it may be stitched by machine. In this case the insertion should be placed quite close to the edges of the garment, so as to cover the seams completely. Thus, if practice in running be desired, the whole garment can be made by means of that stitch by using French seams for the joins, and affixing the insertion round the bottom as well as the top.

N.U.T. NOTES.

BY ALLEN CROFT.

DURING Easter week I attended my nineteenth N.U.T. Conference, and, I suppose, ought now to be in a position to voice a reliable opinion concerning the successive gatherings as they occur. So far as I could observe, the local arrangements were as perfect as ability and foresight could render them; yet few representatives would return to their associations able to report satisfactorily of the proceedings. The fine Guildhall was obviously a very "bad place for hearing." The delegates—at all events, a large proportion of them—became restless, and in some instances pardonably ill-tempered. The President did all that his large experience of public work suggested to minimise the inconvenience. He required every one wishing to address the Conference to ascend the platform and face the audience, and he very kindly repeated every question put from the body of the hall. But the mischief had been completed ere Monday afternoon's session closed; and the brilliant sunshine—there surely never was so delightful an Easter week—completed the reluctance of the members of Conference to "come inside" and feel uncomfortable.

After Plymouth.

* * *

AS every one knows, Mr. Marshall Jackman is at his best as a chairman; the more difficult the position, the more obvious are his genius and resource. And yet all through the Plymouth Conference I could not repress the conviction that it is a mistake for a man to occupy the position of President for a second time. Usually there is the keenest and most affectionate interest in the way the new President acquits himself; at Plymouth there *could* be nothing of this, and I thought—perhaps I was mistaken—that the exchange of Presidents was about the "flattest" ceremony at which I have assisted. The Conference certainly did not "rise" to the new master as it usually does—as it did ten years ago, when he covered himself with glory and distinction under exceptionally difficult circumstances—and I am convinced that the explanation lies in what I have written above. For the first time in the Union's history, the new Vice-President is a woman; and having worked with Miss Cleghorn for over fifteen years, I am able to congratulate the N.U.T. on having elected a President calculated to maintain all the highest traditions of the past, and to add a grace and distinction of her own.

A Reflection or so.

THE public sessions were all thinly attended—I am speaking comparatively, of course—and even the opening session, at which seats are customarily at a premium, showed rows upon rows of empty chairs. The municipal reception was cordial in the extreme, though a trifle long, and the Presidential address was worthy of the man and of the occasion. There was nothing particularly novel or exciting in any of the topics submitted for consideration—perhaps the most significant innovation being the Conference's unanimous demand that the "Acting Teachers' Examination" should be abolished. Less than three years ago, when I first mooted this idea at the Executive, no epithets were too hard for me, no "language" too severe. At Plymouth there was not a murmur of protest from any one! "Training of Teachers" came in for some consideration, and in the end a motion to the effect that "Conference is of opinion that no system for the training of teachers can be satisfactory which does not provide academic and professional training concurrently" was carried by a large majority. I felt, however, inclined to smile on reflecting that a question which had occupied some of the best brains in the Union for many weeks should have been disposed of summarily in little over half an hour.

Public Sessions.

MISS ISABELLA CLEGHORN.

* * *

THE private sessions were mainly remarkable for a series of very fine speeches on superannuation, though whether the improvement of the Act will be accelerated one iota because of them is another story. An attempt to enlarge the Executive by making five officers of the Union *ex officio* members collapsed ignominiously—an injudicious call for a "division" only accentuating the weakness of the support for the proposal. A gratifying feature of the Plymouth private sessions was the total absence of innuendo and insinuation against the personal integrity of the members of the Executive. Practically no new reputations were made at the Conference, and, indeed, few were enhanced.

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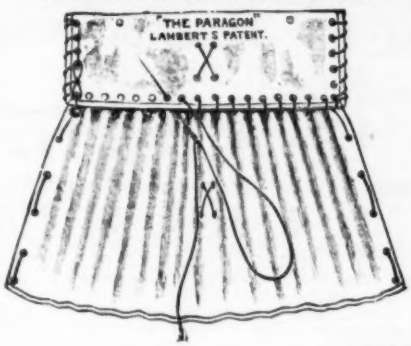

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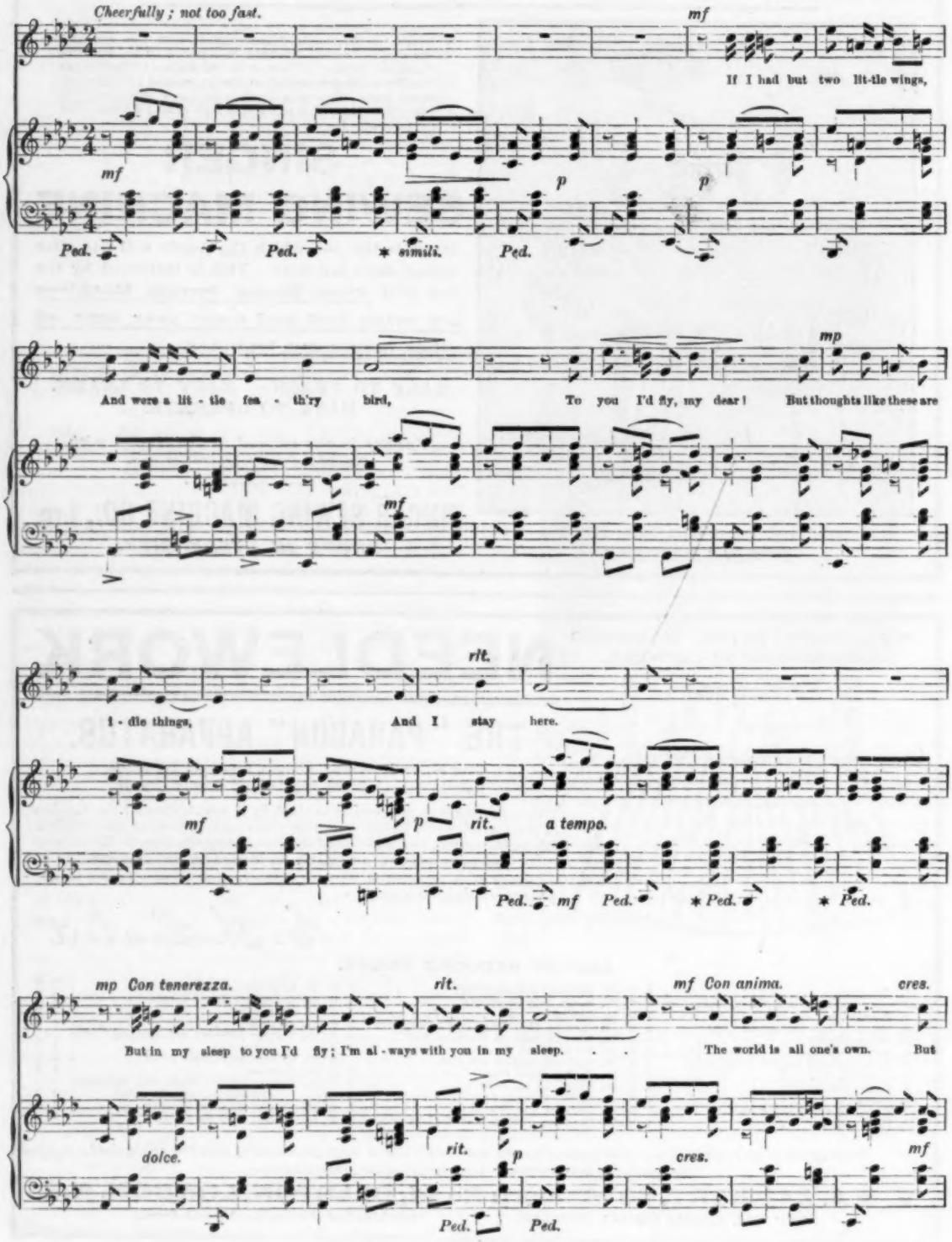
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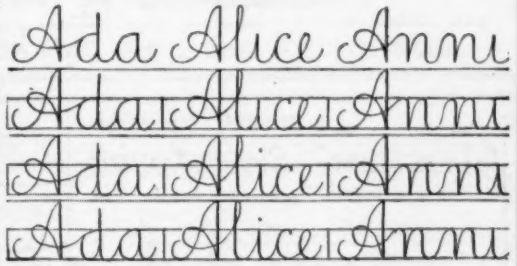

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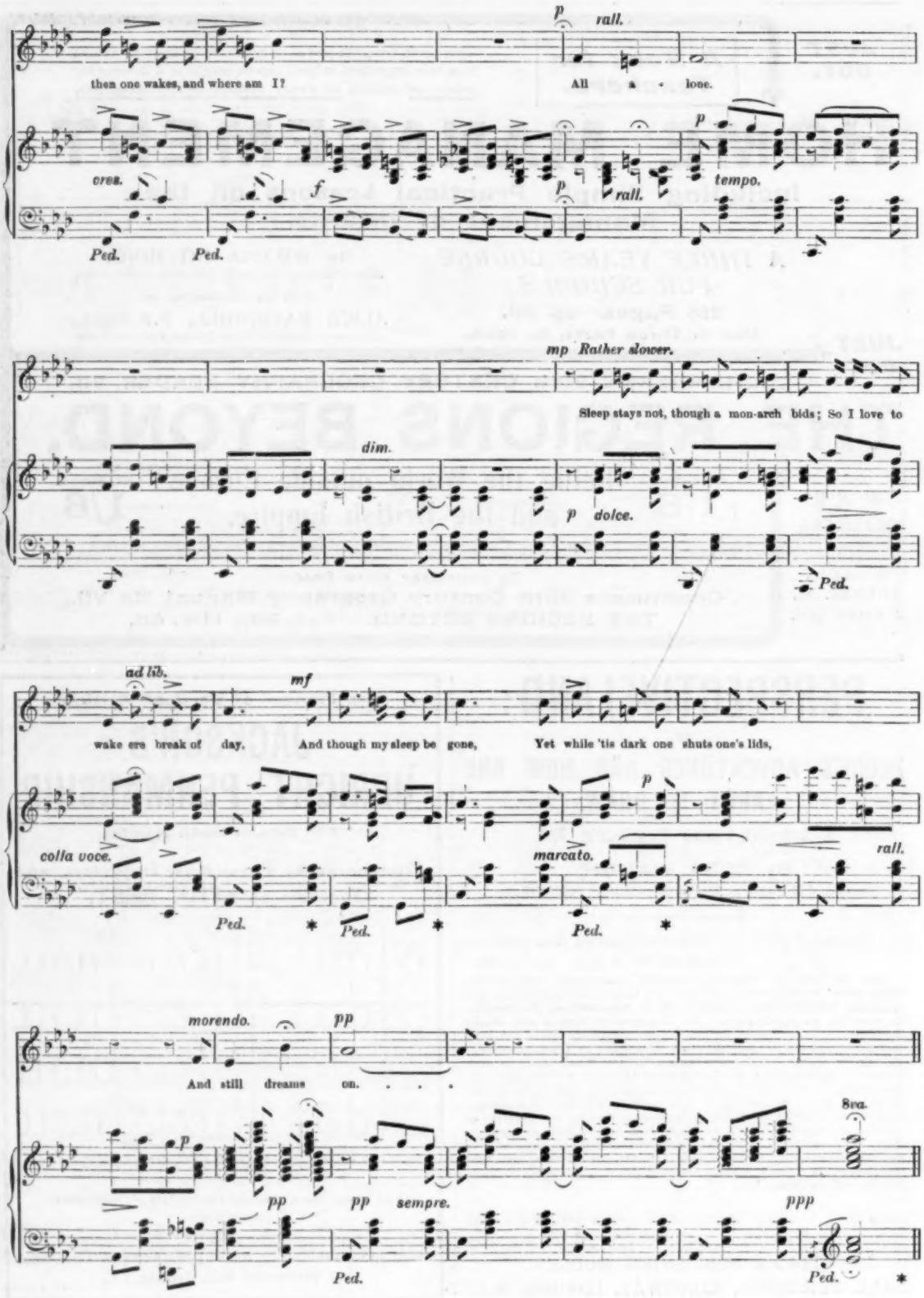
p rall.
then one wakes, and where am I?
All a - lone.
cres.
f
p
rall.
p tempo.
Ped. Ped.
mp Rather slower.
Sleep stays not, though a mon-arch bids; So I love to
dim.
p dolce.
Ped.
ad lib.
mf
wake ere break of day. And though my sleep be gone, Yet while 'tis dark one shuts one's lids,
colla voce.
p
marcato.
rall.
Ped. Ped. Ped.
morendo.
pp
And still dreams on. . . .
8va.
p
pp
pp sempre.
ppp
Ped. Ped.

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it is here told in a pleasing and vigorous manner. The book is well produced, and provided with eight full-page illustrations; but it is a mistake to offer pictures in the Dürer manner to young people, however beautiful the large drawings may be from which they are reproduced.

Pages Choisies des Grands Ecrivains—George Eliot. Avec une Introduction par H. Hovelaque. (*Librairie Armand Colin, Paris.*)

This book is a worthy successor to the volumes which have preceded it. In her contempt for conventionality, and for the opinion of the world, George Eliot presented points of resemblance with George Sand, whose writings exercised a great influence on her mental development. Unlike the great French authoress, her deviations from the ordinary code of morals and conduct were not the result of whim and caprice, but of principles which had secured her intellectual assent. Conscientiousness was the principle which swayed and directed all that George Eliot did or wrote. She was unable to comprehend theory and practice as things apart. As a novelist she must be ranked among the realists. In the presentation in her novels of the English types she knew best, she made them appear exactly in their habit as they lived—moving in the landscapes she depicted with such exact fidelity, and speaking in the dialect she had been accustomed to hear in her childhood. She was less successful, as M. Hovelaque points out, when she attempted to deal with foreign scenes and characters; and her latest novels are partly spoiled by over-elaboration, and a too liberal display of the information she had painfully acquired for the purpose of fitting herself to deal with the subject she had undertaken. The extracts given from her works are well chosen, and their rendering into French is good. *Scenes of Clerical Life, Adam Bede, Romola,* and *Middlemarch* are laid under contribution, and some specimens of her essays and poems are added.

Object and Nature Drawing. By A. Hoten. (*Macdougall's Educational Co., Limited.*)

It is an easy matter to set an "object" before our pupils, and tell them to "draw it," as the official regulations appear to require. But every practical teacher knows perfectly well that the pupil needs definite instruction in object and nature drawing, and will consequently welcome the handsome and helpful volume named above. It is divided into seven sections, dealing respectively with junior object drawing, senior object drawing, studies in light and shade, junior brushwork, senior brushwork, apparatus for plant drawing, and chalk drawing of common objects. There are in all fifty-six plates, about half of them in colour, and the range of objects dealt with is remarkably wide. It must be distinctly understood that the author's aim is not to provide a flat drawing which can be slavishly copied, but to suggest methods of treatment which can be applied to objects of a similar character to those here used as examples. The volume provides a complete course in drawing according to modern ideas. The illustrations are splendidly reproduced. The verbal descriptions of method are simple enough to be readily understood by the youngest teacher on the staff. We fully expect that before long the book will be found in the hands of every progressive teacher in the country.

Scottish Education, School and University, from Early Times to 1908. *By John Kerr, M.A., LL.D.* (*Cambridge Press.*)

The history of Scottish education from early times to the present day is worthy of an epic poem, but Dr. Kerr does very well in plain song. His subject is exhaustively treated, and this volume will provide a mine of information for the next generation of educationists north of the Border, as well as for those Southerners who wish to know how to tackle the thorny subject in the best way. The same benighted Southerners, by the way, will be sorely tempted to gloat over the following:—

"That the teaching (in Scotland before the Reformation), though probably solid and faithful, was not highly advanced, is shown by the fact that those who aimed at the higher reaches of education were obliged to seek it in the oldest of the Oxford colleges—University, Merton, and Balliol—or abroad in France, Switzerland, Germany, and Italy, for Scotland at that time had no great schools of her own."

Of course Scotland, as we all know, has worked nobly since that date, and Dr. Kerr traces the educational work of the country with care and precision right up (or is it *down?*) to the Carnegie Trust, on which we have the following comment:—

"It is beyond question that many, of whose ability to pay their own fees there could be no doubt, have taken advantage of this, and the result has been, as some think, a lowering of self-respect and a slackening of effort in university pursuits."

Dr. Kerr, however, is not engaged, like some of the critics, in looking a gift horse in the mouth. His criticisms are for the benefit of the organisers of the Trust, rather than for the donor. We thank the author for his work, which will save us personally many an hour of anxious research.

A Book of Northern Heroes. By A. J. Dicks, B.A., B.Sc. (*Ralph, Holland, and Co.*)

This book meets with our warm approval. It has been compiled with the object of providing older pupils with typical European heroic stories, such as are now being used with excellent effect in all up-to-date teaching of English. The lessons are in prose and verse, and tell of Sigmund, Sigurd, Siegfried, Olaf, Kriemhild, Beowulf, Ossian, and King Arthur. The original sources are freely drawn upon, and well paraphrased. The book is excellently produced.

The "Philotésie" Syllabus, Report, and Record of Work. (*Philip and Tacey, Limited.*)

Teachers frequently complain that they are obliged to spend in clerical work a large amount of the school time which might be more profitably employed. This is largely a matter of organisation, and of the character of the record book used in the school. The author of the above must know something of the best business methods of the day, for his methodical arrangement of entries is time-saving to the highest possible degree. The record of work is alphabetised for ready reference, and the whole production does the highest credit to both its author and publisher.

THE literary Editor has recently had the pleasure of advising subscribers on the question of the choice of books for their own use and for the use of their pupils. He hopes that queries of this kind will come in large numbers, and will do his best to answer them as fully as possible.

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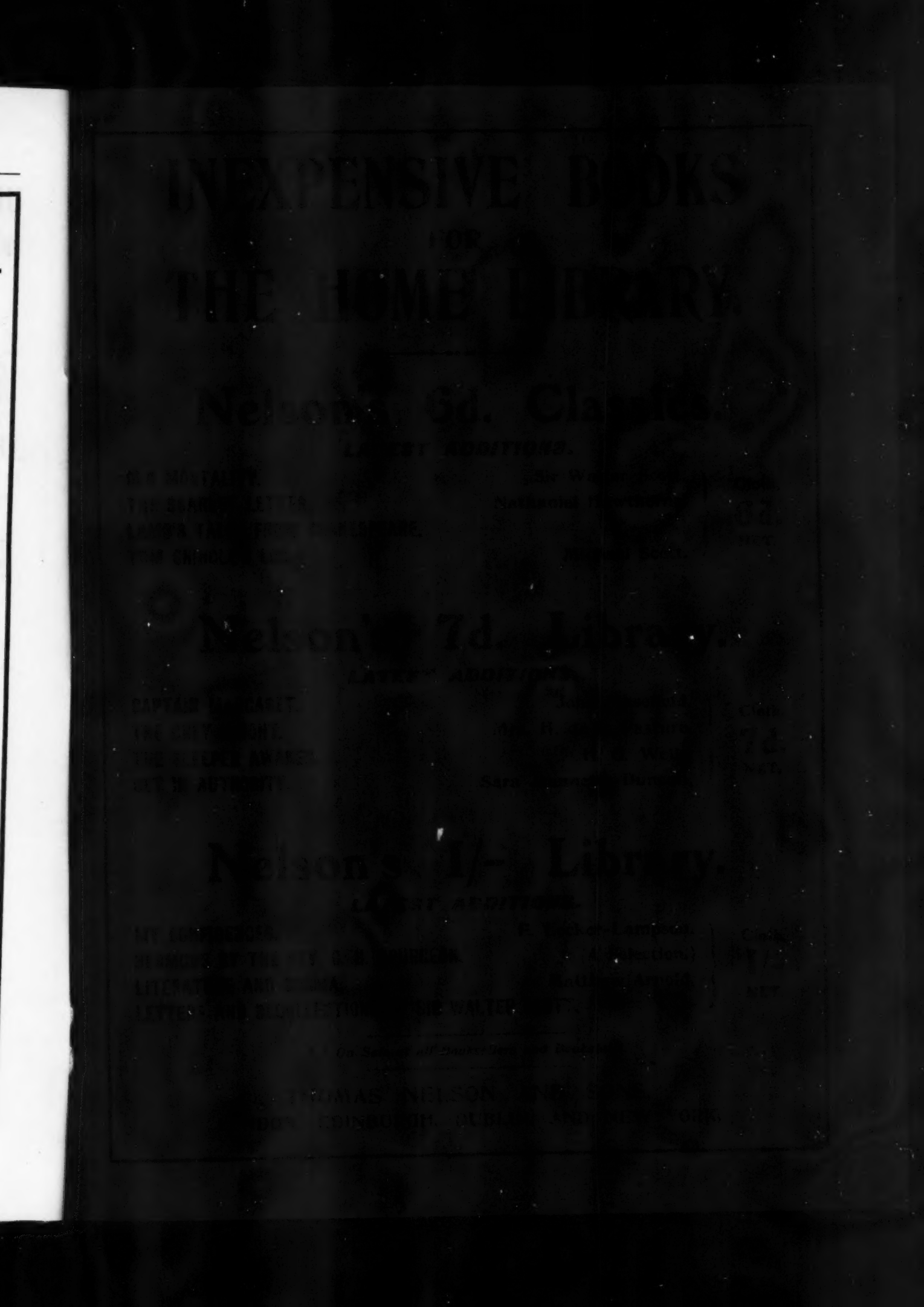
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